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CEREBRAL ARTERIOSCLEROSIS: A REVIEW.

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THE frequency with which interference with the blood supply to the essential elements of the brain is supposed to be responsible for impairment of its higher functions makes the subject of cerebral arteriosclerosis of special interest to psychiatrists. While, as will be seen later, it is not invariably justifiable to presume cerebral arteriosclerosis from the state of the peripheral arteries, it is of interest to note that Clifford Albutt[1] spoke of arteriosclerosis abounding in asylums, but found that high blood pressure and cardiac hypertrophy were less common. Mott[2] observed the frequency of arterial degeneration in the London County mental hospitals, but was impressed by the rarity with which he found intracerebral hæmorrhage at *post mortem* examinations compared with his experience at a general hospital. Bumke[3] refers to cerebral arteriosclerosis as the most common finding at autopsy in a psychiatric clinic. In New South Wales cerebral arteriosclerosis is given as a factor in only 6% of male admissions and 2·5% of female admissions to mental hospitals. In contrast to this surprisingly low estimate, Dr. Farran-Ridge, of Melbourne, has been good enough to inform me that of 254 patients who came to autopsy in the Victorian mental hospitals in 1936, 80 showed obvious atheromatous degeneration of the cerebral arteries, particularly of the arteries at the base of the brain. Further, of 47 patients who had been diagnosed as senile dements, 32 showed atheroma of the cerebral

arteries, while in the remaining 15 the arteries appeared healthy to the naked eye. In the combined statistics of the mental hospitals in the United States of America, cerebral arteriosclerosis is regarded as being present in 16·8% of admissions, only schizophrenia (*dementia præcox*) being diagnosed more frequently (Ebaugh[4]).

Since cerebral arteriosclerosis is a pathological and structural, rather than a clinical or functional, diagnosis, it is proposed in this review to keep in the foreground the pathology of the condition and the relation between the clinical and pathological signs.

Of all the clinical descriptions which have come before my notice during the preparation of this paper, there is none so comprehensive as that given by Bumke,[3] and I therefore make no apology for taking this as the basis for discussion.

Symptoms.

Amongst general symptoms Bumke mentions headache, dizziness and disturbances of sleep. Headache, present in 60% of a series reported by Raecke, commonly takes the form of a heaviness or pressure referred to any or all parts of the head. There may also be a boring sensation or a splitting, bursting feeling. All these symptoms tend to be aggravated by physical or mental exertion or after taking alcohol, and they seldom disappear. Dizziness (in 57% of Raecke's series) is induced or aggravated by such factors as change of posture, physical exertion and emotional stress, which lead to a rise in blood pressure. There may be all gradations between a mild sense of uncertain balance up to intense vertigo with pallor and sweating and syncope. Tinnitus may be associated. Among the disturbances of sleep Bumke refers to the increasing difficulty in getting off to sleep experienced by the intellectual worker during the fourth and fifth decades, ascribed to a loss of elasticity in the cerebral vessels. Hypnotics tend to lose their effect or to prove ineffective from the first. Some arteriosclerotics complain that they constantly wake early in a panic. In the later stages, and usually when intellectual deterioration has set in, insomnia gives place to somnolence.

In the next place we may refer to a number of symptoms of a mild character, which are commonly transient and which are ascribed to a temporary interference with the nutrition of the neurones in one or more sites in the brain. In the sensory group are a variety of paræsthesiæ referred to more or less definite areas, such as a sense of itching or crawling over the whole or part of a limb or in one half of the body. These sensations, which are usually ill-defined in character, may also assume the crude intensity which points to a disorder of the thalamic system. Bumke notes that these sensory symptoms may precede more severe and more indubitably diagnostic evidence by many years. One curious sensation which Bumke mentions is the sense of general shivering without the usual cutaneous phenomena.

The motor symptoms are not so often overlooked or wrongly evaluated, but are included here for the sake of completeness. Transient oculomotor palsies are less frequently to be ascribed to a localized circulatory failure from simple arteriosclerosis, and a syphilitic origin should certainly be sought for diplopia. Unilateral facial paresis may occur. Dysarthria, taking the form of a difficulty and a slowing of articulation and occasionally ascribed to emotional factors, is quite a common occurrence in cerebral arteriosclerosis. The slowing is, of course, part of the patient's effort to control the dysarthria, and he frequently displays irritation and embarrassment at his lack of success.

A man, aged forty-nine years, complained of increasing fatigability, and for some months his voice, which he used largely in his profession, had been apt to fail him, and often he felt unable to articulate clearly. He stated also that his writing was often irregular and at times he could hardly write a letter. Examination revealed a systolic blood pressure of 200 and a diastolic pressure of 125 millimetres of mercury. The urine contained a faint cloud of albumin. The blood failed to react to the Wassermann test. Neurological examination revealed nothing beyond exaggerated tendon reflexes and marked lingual and labial tremors. There was no motor or sensory impairment. Mentally he seemed a trifle dull and failed to recall proper and place names which should have been familiar to him. Evidence of loss of mental efficiency was obtained from friends.

Some cases which have an arteriosclerotic basis present a clinical resemblance to general paralysis.

A man, aged forty-six years, had been becoming forgetful and inefficient over a period of eight months, but remained at work until two months before he was admitted to hospital. He then had a slow slurring speech. His pupils reacted somewhat sluggishly to light; but the convergent and consensual responses were present, as were also the tendon and cutaneous reflexes. It was thought that there was some wasting of the interossei and of the thenar and hypothenar muscles. Mentally he was foolishly cheerful and even expansive, and distinctly irrelevant in his conversation. The peripheral arteries were soft and the blood pressure was 156 millimetres of mercury, systolic, and 98, diastolic. Contrary to expectation, both blood and cerebrospinal fluid failed to react to the Wassermann test, and the spinal fluid showed no increase in cells or globulin and produced no change with the Lange test. He was, nevertheless, given malaria, and had six good rises in temperature; but his dementia progressed rapidly and he died a year later in Callan Park.

Examination of the brain revealed an œdematous and hyperæmic pia which contained opaque plaques and amyloid bodies. There was considerable sub-pial felting, together with an excess of small round nuclei. Small-celled reaction was also in evidence in the perivascular spaces. There was definite arteriosclerosis, also productive arteritis.

The speech disturbances may be aphasic rather than dysarthric. I must confess that in patients with high blood pressure and aphasia who have come under my notice I have been unable to find any instances of pure nominal, verbal types *et cetera*, although one could say that the defect was more on the executive than on the receptive side, or *vice versa*. Unlike Head's patients, most of whom had had a localized cerebral trauma, the aphasics of vascular origin often display some general intellectual reduction.

In the hand we have apraxias and pareses sometimes regarded as writer's cramp. Comparison of the patient's writing with his script of months or years ago may be helpful, and his failure to detect and correct mistakes in spelling and expression offers tangible, if sometimes illegible, proof of mental failure.

Bumke notes that the pupils are not infrequently unequal, but never irregular, and the reaction to light is never impaired without an associated loss of the reaction to convergence due to a nuclear hæmorrhage.

Epileptiform fits, seldom with localizing signs, may occur at any stage.

Mental Symptoms.

Since the condition under review is in most instances generalized throughout the brain, mental symptoms are usually present, if not prominent, and may conveniently be described according to Jackson's scheme of dissolution in two groups, those due to defect and those due to release.

In cerebral arteriosclerosis there tends to develop a gradual failure of the higher intellectual faculties, at first insidious, but slowly and steadily progressive, and with more pronounced impairment after such acute episodes as fits, paralyses and confusional attacks. At first the patient experiences increasing difficulty in applying his mind to his usual tasks, and naturally the intellectual worker and the skilled craftsman are more likely to become aware of impairment of the "latest developed and least organized" at a relatively early stage. The patient may also complain of increasing fatigability, more especially in regard to mental exertion, of inability to recall proper names and numbers, and of increasing difficulty in making decisions and in facing up to new situations. By this time those more closely associated with the patient will have noted that he has become less alert, that his conversation is less direct, that words often fail him, and that his replies show a perseveration of thoughts and phrases in the same way as his general conduct shows a lessened adaptability and increasing restriction to habitual ways. In some instances one may learn that the patient has forsaken his hobbies and recreations, feeling that his livelihood demands all his energy. At this stage the history of change in disposition, mental outlook and efficiency, and the impressions received by relatives and colleagues are at least of equal diagnostic value to the medical examination of the patient, and a progressive condition is to be feared. Sooner or later the defects of memory, as shown by the inability to recall more recent events and even to comprehend and retain new impressions, become so constant and so gross that intellectual failure is no longer to be doubted.

Coming now to release symptoms, it is to be noted that the patient loses control over his emotions to a greater extent and under less provocation than was his wont. At first it may be a question only of the naturally irritable man becoming more touchy and explosive, or of the born pessimist displaying more anxiety and distress over real or imagined difficulties. As cerebral arteriosclerotics retain a keen awareness of their failing capacity until mental deterioration is fairly advanced, some emotional reaction is not unnatural. In common with other varieties of organic brain disease, these patients are apt to show what Goldstein[6] has termed the catastrophe reaction, a leading feature of which is the often sudden and usually pronounced emotional display which follows upon the inability to cope with a situation. Other mood disturbances which may occur are more or less sustained depressions with hypochondriacal preoccupations and sense of unworthiness and culpability, or, on the other hand, manic episodes with an exalted mood, the expression of extravagant ideas and erratic behaviour. A history of depressive or manic phases before the involutional period will, of course, make less likely any ætiological relationship to arteriosclerosis. In the same way a suspicious attitude may be part of the patient's psychological make-up, and is so commonly a feature of involutional changes that it can hardly in itself be considered significant of dementia. More rarely acquisitive and sexual tendencies are no longer held in check and the arteriosclerotic of hitherto irreproachable morals is charged with petty theft or sexual misdemeanour.

There are one or two points in the mental symptomatology which call for special attention. There is hardly any symptom which is in itself diagnostic, whereas the clinical picture of progressive incapacity, memory defect and emotional instability points with certainty to dementia. Little as it may concern or help the patient, some effort may be made to determine the type of dementia. In the first place one may consider those types which are unaccompanied by any physical signs.

In senile dementia there is a deterioration which progresses at a moderate rate over a period of years, with onset not before the seventh decade. On the whole, the course is steady and the intellectual rather than the emotional systems tend to be in the forefront of the symptomatology. Acute and transient episodes, especially confusional attacks, are less common than in arteriosclerotic dementia. A history of mental decay in elderly relatives may be obtained in both groups and is of little value in the absence of undoubted evidence of associated arteriosclerosis. At best, the diagnosis between senile and arteriosclerotic dementia is apt to remain uncertain even, as will be pointed out later, after the brain has been subjected to microscopic examination.

Pre-Senile Dementia.—There are two syndromes described respectively by Alzheimer and Pick, the outstanding features of which are an earlier age of onset (fifth decade onwards) and a fairly rapid course, in which loss of memory is an outstanding feature. In both these varieties epileptiform seizures occur sooner or later, and also disturbances of speech, such as jargon aphasia, which, together with spasms affecting one or more limbs, raise the

question of some localized disease. Pathological examination reveals a wide-spread degeneration of the grey matter, especially of the frontal lobes. The atrophy of neurones is, in Alzheimer's variety, associated with a great number of the argentophile plaques which are a common feature of senile brains. In Pick's disease there is a simple decay of the neurones, mainly in the outer layers of the cortex in the frontal and temporal lobes; but plaques are not specially in evidence. In both of these pre-senile dementias vascular degenerative changes are said to be absent from the brain.

The Pathology of Cerebral Arteriosclerosis.

The degenerative process may affect the sub-endothelial structures of the larger arteries, the circle of Willis and the surface vessels and deep perforating branches (atherosclerosis). The reduction of the blood supply to the brain, if sufficiently great or prolonged, leads to disintegration of the neurones, more especially in the third cortical lamina, which is intimately concerned with the function of association. The subcortical structures undergo a similar disintegration, but here the disappearance of cells is less striking owing to their normally less regular distribution. Accompanying the disintegration of neurones are an overactivity of the astrocytes and a small-celled infiltration into the perivascular spaces. Binswanger described a subcortical encephalitis in which sclerosis of the long perforating arteries, entering the basal ganglia and white matter from the base of the brain, leads to scattered small areas of demyelination.

The smaller branches may undergo hyaline degeneration in syphilis, chronic toxic states, such as alcoholism, and in old age (Biggart[6]). The small cortical arterioles seem to be particularly liable to undergo this change, which begins under the intima and eventually involves the whole wall of the affected vessel. The hyaline substance stains darkly and diffusely with hæmatoxylin and may react to fat and amyloid dyes. The diseased arterioles are surrounded by areas denuded of neurones, but showing glial over-growth. The condition is patchy and irregular in incidence, except that the grey matter is affected to a greater extent than the white.

A man, aged seventy-five years, was admitted to a mental hospital with a history of mental failure extending over a period of about five years. There was a gross defect of memory, together with restlessness, spasmodic movements, jerky speech and facial contortions. His gait was described as lurching and awkward. His condition was like that of Huntington's chorea, but there was no family history. Examination of the pupillary, tendon and cutaneous reflexes revealed no abnormality. The peripheral arteries were somewhat thickened and tortuous.

On microscopical examination the brain appeared œdematous; there was a good deal of degenerative change in the arterioles and capillaries, and there were also scattered areas of degeneration involving both neurones and glia cells, forming a microscopic *état criblé*.

The brain in the following case was sent in response to a request for material which might show arteriosclerotic changes.

A man, aged sixty-eight years, was admitted to a general hospital complaining of a chronic cough. His systolic blood pressure was 160 and diastolic 105 millimetres of mercury. His heart was moderately enlarged and the walls of the peripheral vessels were palpable. The retinal fundi were normal. Examination of the central nervous system revealed no abnormality. He was mentally clear until shortly before death. There was fairly heavy albuminuria and the blood urea content was 62 milligrammes per 100 cubic centimetres. Brochopneumonia ensued and the patient died two weeks later. *Post mortem* there was found very extensive arteriosclerosis; the lower part of the right femoral artery was calcified, but the brain showed no gross abnormality beyond some thickening of the *pia mater*. To the naked eye the cerebral arteries appeared healthy.

Microscopic examination revealed degeneration of the cerebral arteries, arterioles and capillaries, with microscopic softenings, miliary hæmorrhages and areas of spongy tissue degeneration in various parts of the brain including the lenticular nuclei and cerebellum, also great destruction of neurones. Special staining revealed a few of the plaques which are a more typical feature of senile brains.

The absence of striking clinical evidence of cerebral disease in this case is remarkable. As a contrast there is the following case.

A man had been admitted to a mental hospital in 1903 with delusional insanity, and his condition gradually deteriorated. In 1931 his systolic blood pressure was 152 and diastolic 82 millimetres of mercury, and the radial arteries were sclerosed. In 1937, at the age of seventy, he was described as being demented and feeble, but without any neurological signs.

At *post mortem* examination some of the larger cerebral arteries were found to be sclerosed and microscopic examination revealed degeneration in the smaller vessels and capillaries. There was a good deal of neuronic disintegration; but parts of the cortex appeared much worse than others, possibly owing to disease of the main artery to the area. Plaques were present. For many years before death this patient had profound mental deterioration, and yet the microscopic changes were hardly more striking than in the preceding case.

The following case illustrates the importance of microscopic examination of the brain when the clinical diagnosis of some evidently cerebral condition is uncertain.

A man, aged thirty-nine years, a battery worker, was under treatment in hospital with sciatic neuritis, became drowsy and gradually failed mentally. Both lethargic encephalitis and cerebral tumour were considered as diagnoses; but neurological examination and ophthalmoscopy revealed nothing enlightening. A *post mortem* examination of the brain revealed no evidence of gross disease; the brain was reserved for microscopic examination. Both small arteries and capillaries showed degenerative changes, the former being hyperplastic and in many instances occluded. Disintegration of neurones and overgrowth of glia were also in evidence.

The possibility that the cerebral arterial changes were due to plumbism has to be considered in this case in view of the occupation; but evidently clinical evidence was lacking during life.

In most arteriosclerotic brains the capillaries appear constricted, and special silver stains reveal a tangle of surrounding fibres which are connected with the adventitial coats of nearby arterioles.

In senile dementia, which clinically and pathologically should be distinguished from cerebral arteriosclerosis, although it must be admitted, as Shaw Bolton and others have pointed out, that

mixed conditions are often encountered, the typical microscopic change is a simple atrophy of neurones, together with accumulation of lipoid in the surviving neurones and in the walls of the smaller vessels. Another typical feature is the argentophile plaque, which may be observed in great numbers in the cortex of the frontal lobes and elsewhere. A few of these plaques, which are composed of amyloid and fatty substance, may be considered as normally present in the brains of elderly individuals; but they are especially numerous in senile and also in pre-senile dementia.

Cerebral Arteriosclerosis and Cerebral Tumour.

Headache, vomiting and papillœdema, together with epileptiform convulsions and focal signs, at once suggest cerebral tumour. The following two cases illustrate difficulties in diagnosis.

A man first came under medical observation at the age of sixty years, on account of headache, irritability and forgetfulness, and fits in which he tended to fall to the right and which were sometimes preceded by an olfactory aura. He came under observation again at the age of sixty-six, with a history that every five or six weeks he had a fit in which he fell to the right. He also complained of flashes of light, of unpleasant smells ("a Rotorua smell") and of occasional inability to find the right word. He said: "You would be talking and its funny you can't remember that—if you wait for a second I'll tell you that—you just forget." No motor or sensory loss was ascertained and both tendon and cutaneous reflexes were brisk and equal. Papillœdema was well marked in both eyes and was more intense on the left side. There was a slight concentric limitation of both visual fields. He complained of headache and was mildly irritable and confused. The systolic blood pressure was 140 and the diastolic pressure 92 millimetres of mercury. The peripheral arteries appeared healthy, and the urine contained neither albumin nor sugar. The blood failed to react to the Wassermann test. A diagnosis was made of tumour in the left hemisphere, probably in the left fronto-parietal region and involving the left speech area. A ventricular puncture was performed, when the cerebro-spinal fluid was found to be under normal pressure. The patient's symptoms became worse and he died several days later. *Post mortem* there was found an old thrombus in the left internal carotid artery. On sectioning the brain there was no tumour; but in the grey matter, both of the cortex and of the basal ganglia, there were mottled areas of pallor, and the interior part of the right caudate nucleus contained numerous small cysts—the lacunar cerebro-sclerosis of Pierre Marie and Grasset. Microscopical examination showed the larger vessels to be healthy; but there was widespread degeneration of the smaller vessels and capillaries, with a good deal of perivascular mononuclear and fibro-hyaline cell infiltration and activity of the microglia, and many small areas of softening were observed.

A woman, aged fifty years, had been in a mental hospital for two years, suffering from delusions, when she became dull and unresponsive and weak on the right side. On examination she lay with her head inclined to the left and held her left hand to the top of her head, which did not, however, seem tender on palpation or percussion. The pupils were equal in size and reacted to light and accommodation. The corneal reflexes were present. The conjugate movements to the left, especially of the left eye, were defective, while towards the right the movements were full, but there was nystagmus. There was some slight weakness of voluntary movement in the upper part of the face on the left side; but the movements of expression were equal on both sides. The tongue was protruded in a straight line. The right arm was semi-flexed and spastic, while the right leg was fully extended, with the toes pointing downward. All the tendon reflexes were very brisk in the right arm and leg; on the right side also there were elicited ankle clonus and an extensor plantar reflex. There appeared to be no loss of sense of light touch or pain on either side of the body. The systolic blood pressure was 150 and the diastolic pressure 110 millimetres of mercury. The blood serum failed to react to the Wassermann test. The urine was normal. A provisional diagnosis was made of tumour of the left frontal lobe. Ventriculography was then performed, when the fluid was found to be under increased pressure. The right lateral ventricle was found to be displaced to the right not far from the surface of the temporal lobe. Further operation was not attempted. At autopsy some time later the left cerebral hemisphere appeared flattened. There was found an area of softening which was necrotic and hæmorrhagic, 8·0 by 4·0 by 2·0 centimetres in size, extending from the posterior end of the superior frontal gyrus to within 1·0 centimetre of the parieto-occipital fissure, underlying the upper part of the motor area, paracentral lobule and callosal sulcus. Deep in the softening there was found a small thrombosed vessel.

While hyperpiesis and evidence of renal failure would incline one against a diagnosis of cerebral tumour, these may be absent, as these two cases show. It is said that paralysis and other focal symptoms tend to develop rapidly in cerebral arteriosclerosis, but slowly and gradually in cerebral tumour, unless there occurs a hæmorrhage into the tumour. On the whole, patients with tumours fail to show remissions or periods of improvement, whereas numerous attacks with more or less recovery may occur in cerebral arterio-sclerosis. Sachs[7] gives distortion of the ventricles as favouring tumour rather than arterio-sclerosis, but the cases mentioned above illustrate difficulties which may arise in diagnosis. In 1871 Hughlings Jackson noted "softening of several convolutions of hind part of anterior lobe in a case presenting double optic neuritis".

Hypertensive Crises.

In certain cases of hypertension there would appear to occur some abrupt change in the cerebral circulation giving rise to symptoms which are severe but fortunately, as a rule, transitory. The condition has been studied by Oppenheimer and Fishberg, who coined the term "hypertensive encephalopathy", and more recently by McAlpine,[8] who distinguishes cases with and without cerebral œdema. Both groups show the common features of rapid onset of severe headache, varying degrees of impairment of consciousness up to coma, epileptiform convulsions and an absence of nitrogen retention. The attacks follow upon a rise in blood pressure and subside with its fall. The cases with cerebral œdema occur in individuals usually under middle age and often the subjects of acute nephritis. Severe headache is an outstanding feature, and there may be vomiting of cerebral type. The pressure is raised in the cerebro-spinal fluid as well as in the blood. Ophthalmoscopy reveals a hypertensive retinitis with constriction of the arterioles, which may be observed to vary from time to time, hæmorrhages, retinal exudates and papillœdema. The latter may occur without retinal changes. Epileptiform convulsions and paralyses may accompany the attack, which rarely lasts as long as a week.

The second type, without œdema, occurs after the age of forty in subjects who have had hypertension for many years, and who often give a history of recurring headaches and paralyses. In the hypertensive attack there develop coma or convulsions or both. The blood pressure is raised considerably above its already high level; but the pressure of the cerebro-spinal fluid is not raised, and papillœdema is absent. The retinal vessels may, however, appear constricted. There is usually some albuminuria and, as in the other group of cases, the blood nitrogen content is within normal limits. McAlpine points out that a raised blood pressure is a factor common to both types, and as additional contributing causes he suggests previous cerebral thrombosis and possibly a chemical factor. It seems hardly logical to dissociate minor transitory phenomena, such as paralyses and sensory symptoms, from these more severe crises. How do these symptoms develop and disappear? Now that both experimental and histological proof is forthcoming of a nerve supply to the smaller vessels of the pia and of the grey and white matter, spasm of the arterioles can no longer be regarded as impossible. Moreover, with vessels undergoing proliferation of the endothelium it is easy to see how a slight reduction in calibre may lead to stagnation of the blood supply. In those cases in which microscopic examination reveals sclerotic or hyaline degeneration to the extent of complete destruction of the elastic and muscular tissues in the arterioles, with more or less reduction in calibre, but short of occlusion, may we not suppose that the brain has become more than usually dependent on the pressure in the extracerebral circulation? If one may make a homely comparison, the dwellers on heights are apt to suffer a failure of their water supply when the demands lower down are especially heavy, and all the more if the pipes are corroded and partly occluded. With the extraordinary hunger of the neurones for oxygen in comparison with other tissues, slight interference with the blood flow is followed by relatively severe consequences, hence the not uncommon observation of exacerbation of symptoms following a fall in blood pressure.

As Cobb[9] has pointed out, in the brain it is a matter of relative anoxæmia rather than of complete anæmia, the result in the part affected being œdema, vaso-dilatation and diapedesis of red cells (brain purpura), leading on to necrosis. Although it would appear that the arterioles in the brain have a free anastomosis, the blood pressure in them and in the capillaries tends to be low in comparison with that in the larger vessels, so that once œdema occurs partial occlusion results, the blood flow suffers a further check, and a vicious circle is established. This, rather than spasm, would appear to be the underlying mechanism in sclerosed vessels.

There is one other organ, the heart, ischæmic conditions of which present an analogy with a range of symptoms of all degrees of severity, both transitory and permanent.

The Ophthalmoscopic Diagnosis of Cerebral Arteriosclerosis.

Sclerosis of the retinal arteries may be recognized by their whitish, so-called silver-wire appearance (which the electric ophthalmoscope is apt to produce in normal vessels if too great illumination is used), narrowed calibre, a narrow white border on either side and compression of underlying veins. The retinal field may be dotted with hæmorrhages and small sharply defined white areas. The term hypertensive neuro-retinopathy has been given to swelling of the optic disk, with œdematous and atrophic patches in the retina and flame-shaped hæmorrhages in cases of hypertension. Finally, papillœdema may occur from cerebral œdema in hypertension. There has been considerable difference of opinion as to the possible toxic and more particularly renal origin of some of these retinal appearances, and the difficulties of diagnosis between arteriosclerotic and albuminuric retinitis are admitted by many observers. In a discussion at the Royal Society of Medicine, Foster Moore[10] stated that diseases of the retinal arteries might be recognized in the majority of cases of general arteriosclerosis, and he believed that the exudates in the retina resulted from impairment of the blood supply rather than from excess of tension within the retinal vessels. Moreover, while the vessels in both eyes might appear sclerotic, the retinal changes due to sclerosis are frequently unilateral, in contradistinction to toxic, including renal, retinitis. The prognosis of cases with arteriosclerotic retinitis as regards life was much better than that of renal cases in Foster Moore's series, although a larger number died with some gross cerebral vascular lesion. The average duration of life after the discovery of retinitis was two years and eight months in twenty-eight fatal cases, while thirteen patients still under observation had an average duration of life of five years and five months.

The Relationship between Sclerosis of the Cerebral Vessels and Clinical Signs.

The relationship of arteriosclerosis to clinical signs, and more particularly the relationship to mental symptoms, has been the subject of numerous researches. Shaw Bolton[11] noted the absence of gross degeneration of the cerebral vessels in many cases of aged people with mental impairment, and also the contrary. At the same time he is of opinion that, with the exception of rare instances of presenile dementia, intellectual impairment is seldom profound without coexistent gross degeneration of the cerebral vessels. He formulates the general relationship between degeneration of the cerebral vessels and the development of dementia in the following terms:

> In a cerebrum which has begun to break down, or where degeneration has progressed to the "moderate" stage, the presence or incidence of gross degeneration of the cerebral vessels will cause more or less rapid progress of the neuronic dissolution, with, from the clinical aspect, gross dementia.

Shaw Bolton finds that extra-neuronic reparative reactions are more in evidence in patients with a

history of prolonged alcoholic excess or with organic disease of the heart or kidneys than in those with simple senile decay of the neurones. On the other hand a high percentage of recent senile cases with mild dementia, but with considerable mental confusion, showed to the naked eye degeneration of the cerebral vessels

*Mental Conditions in the Aged.**

	I	II	III
Number of cases	27	13	49
Males	19	6	26
Females	8	7	23
Average age	69·6	69·9	65·3
Mental symptoms	15 (55%)	10 (70%)	31 (63%)
Previous strokes	7	1	5
Onset sudden	20	2	37
Onset gradual	6	8	7
Onset uncertain	1	3	5
Hemiplegia, right	13	2	18
Hemiplegia, left	7	3	19
Blood pressure	153/96	145/86	174/100
Blood urea	22·5	24·6	24·3
Areas of softening	24	5	35

I = Cases of atherosclerosis.
II = Cases of arteriolosclerosis.
III = Cases in which vessels of both sizes affected.
* *After* Rhein, Winkelmann and Patten, quoted by Biggart.

The question has been reviewed more recently by Wertham,[12] whose conclusions, based largely on his own observations, are worthy of close attention. Cerebral arteriosclerosis is looked upon as a metabolic disease of the blood vessels, which may take the form of atherosclerosis, arteriosclerosis or capillary fibrosis, the latter being frequent in senile brains unaccompanied by arterial changes. Mechanical obstruction from sudden or gradual occlusion of the blood vessels is to be held accountable for only a small part of the lesions which may occur in cerebral arteriosclerosis, the causation for which must be sought in functional disorders of the circulation. "Cerebral arteriosclerosis", says Wertham, "may therefore be characterized as the various consequences of disorders of circulation due to a continuation of organic and functional alterations of the blood vessels." He expresses a doubt whether lobar atrophy can occur as a result of cerebral arteriosclerosis alone. With regard to disintegration of neurones in the third cortical layer, which is commonly found in cerebral arteriosclerosis and which some authorities regard as a typical feature, Wertham examined a number of unselected brains obtained from a general hospital and observed that the third layer was affected in many instances of cerebral and also of general bodily disease, and that it "may be severely damaged in affections of the brain which do not go with mental symptoms at all". Whilst severe sclerosis of the cerebral arteries is rarely unaccompanied by similar changes in the peripheral arteries, the converse by no means holds good. Reference is made to Neubürger's findings of 10% of cases of cerebral arteriosclerosis showing sclerosis in arteries elsewhere in the body. Further, there is no consistent relation between cerebral arteriosclerosis and the systemic blood pressure, which may be raised, lowered or normal. Moreover, "in some cases the brain substance shows many 'vascular lesions'—*i.e.*, lesions of a sort that can be produced only on a vascular basis—and yet the vessels are free from any demonstrable changes, and hypertension was not present while the patient was alive". Wertham finds more coordination between cerebral pathology and bodily constitutional types according to a scheme formulated by Neubürger and supported by his own observations. In the hypertonic type, occurring in individuals of a thick-set, plethoric habit with hyperpiesis and cardiac hypertrophy, cerebral symptoms make their appearance in the fifth decade in the form of apoplectiform attacks due to large hæmorrhages and not invariably accompanied by arteriosclerotic changes. At a little later date, between the ages of fifty and sixty, these hypertonics become prone to transient focal disturbances, such as paralyses, deliria and epileptiform convulsions. In these, according to Wertham, "very extensive hyaline degeneration of the small intra-cerebral vessels is always present", while arterio-capillary fibrosis is seldom to be observed.

Neubürger's second type comprises individuals who are spare and even emaciated, with a blood pressure which is only moderately raised, and in whom cardiac hypertrophy is rare. These senile patients come under observation from the age of seventy years onwards, and in addition to focal symptoms usually have some degree of senile dementia. In contrast with the cerebral pathological findings in hypertonics, atherosclerosis of the basal vessels and arterio-capillary fibrosis are common, while hyaline degeneration is less in evidence in the senile group, and apoplexy is due rather to anæmic softenings than to massive hæmorrhage. Wertham regards the correlation between histological findings and mental symptoms as uncertain in the present state of our knowledge.

What the difference is histologically between the cases with severe mental symptoms and those without them, cannot be defined clearly. Besides the quantitative factor (amount of parenchyma destroyed), which is clearly important but not yet adequately studied, other factors play a rôle such as mode of development, localisation, age, general constitution, status of the organs of the body, emotional life, etc.

We may conclude that while cerebral arteriosclerosis may be inferred with a fair degree of certainty when mental deterioration, with or without focal signs, occurs in the subjects of general arteriosclerosis, in many more cases the existence of this pathological change can be suspected only during life, and final proof depends upon the results of microscopic examination. Even so, the older the patient, the greater will be the probability that simple neuronic decay is the major factor in the clinical condition, with the reservation that cerebral arteriosclerosis cannot be excluded until the brain has been examined microscopically.

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THE SPIRIT OF ADVENTURE.[1]

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I HAVE a feeling that were we permitted, all invisible, to watch any medical man as he took up and opened his medical journal on the morning of its arrival, we could learn, from his manner of procedure, a good deal concerning him. Having got rid of the tiresome wrappings and flattened the journal, he would read through the list of "contents". Then he would turn to the page upon which was printed the matter that appeared to him to be the most interesting at the moment. I imagine that we have all passed through definite phases in this ritual. There was a phase in which the most scientific-sounding title attracted us, and the perusal of many pages adorned with formulæ and graphs was a real delight; but there comes a time when these more abstruse articles are put aside for quiet study later on, and there also comes a time when this "later on" never arrives. Then, perhaps, an era dawns in which shorter articles with more attractive titles are turned to first, or it may be with some that book reviews take first place. Many of us have passed into the stage when correspondence, often expressed with some wit or some sarcasm, appears most appropriate for first reading. Others have gone even further than that in neglecting the more strictly professional subjects as first choice, and I freely admit that I have passed into the stage of turning in first instance to the obituary notices. And I do this not only because it is in these columns that, regrettably, the matter is most often personal and real to me, but because in the biographies, no matter how brief they may be, there is always likely to be some little revelation that makes easier the understanding of a man's career.

Now if we should take a series of the brief obituary notices that appear today in our scientific journals and compare them with the records of the lives of our precedessors of, say, a century ago, we should, I think, be forced to admit that a subtle change has come about. It seems as though the lives of the men who are passing away today are far less picturesque than were those of their forerunners. Moreover, it becomes apparent that there are far fewer outstanding personalities depicted today than were chronicled even a generation ago. It is true that this may be more apparent than real, since the obituary notice naturally tends to be far less frank than the work of genuine biography. It is published too near the event, and there are the relatives and friends of the man to be considered; but this does not account for all.

How often nowadays could the writer of an obituary notice call attention to the fact that the departed had been well known by reason of the peculiar hats or coats or ties that he persisted in wearing, despite the change of fashion? How often could he draw attention to a peculiarity of habit, of address, or of mode of life that made him a familiar figure, and perhaps endeared him to many? I can remember many men, who were at the height of their fame during my student days, who dared to be individuals. I recall a distinguished physiologist whose devoted family spent the long winter evenings in making him neck-ties of such enormous size that they were unprocurable in any shop and were not worn by even the most Bohemian member of the Latin quarter; yet he wore these ties with great distinction. Many of my period will recall a fashionable physician whose distinctions of dress and whose remarkable chariot, swaying from immense "C" springs, set the Whitechapel Road agape twice every week. Today I have no such friends among my contemporaries, and I should imagine it is possible that Emeritus Professor Archibald Watson would be the last I shall ever know.

There seem to be few men whose deaths are recorded in our journals today who dared to express their individuality, though many of them may have been remarkable personalities. In truth I think we are all sinking to the common level of a standardized loss of individuality. Few are prepared to let their fellows know that they are non-conformists, in a world that accepts commonplace mediocrity as the hall-mark of respectability. Doubtless there are those among us who would dare to be Daniels, but who yet shrink from the adventure of expressing their individuality by any outward and visible sign.

It is not only in adventures in individuality that modern medical men are lacking; there appear to be few of whom their biographers see fit to recall any very strange enterprises or any very stirring incidents. To me it seems probable that when the

[1] A public lecture delivered at the fifth session of the Australasian Medical Congress (British Medical Association) in August, 1937.

biographies of the next generation or so are chronicled, the note will be still flatter; and this despite the disturbed times through which the world is passing and will pass.

Men will go to war, no doubt, and, what is more, it seems likely that in the future war will come to every man, whether he fancies the business or not. But modern war holds no high spirit of adventure, and the pity is that the younger generation has not realized this very sordid fact. There was a time—the time of Gale and of Clowes, of Woodall and of Ardenne—when every surgeon of note went to the wars to learn his craft on the field of battle. There was a time when medical men became the followers of armies in foreign parts, in quest of pure adventure; but these days are past. Modern warfare has lost its romance: the tank has taken the place of the charger, and all the beastliness of chemical gas has replaced deeds of chivalry upon the open field. War is no longer an adventure; it is a degrading business, without glamour, in which the individual is submerged in the sordid working of a hideous and relentless machine.

To the Great War flocked thousands of the best of the medical profession. Their deeds and, alas, their deaths are deservedly written in letters of gold; but I doubt if many of the survivors would face the next war in a spirit of adventure. They would face it as a duty, as a necessity, but as a thing to be loathed, and not as something to be undertaken with high hopes of romance or for the satisfaction of a desire to seek hazards in the attainment of an ideal.

Doubtless each new generation that grows up in ignorance of the sordid realities of war will be persuaded that a glamour of romance is still attached to martial enterprises; but it would seem that future wars will come to all men, and he who goes to war will be no more a hero than he who remains behind. This of necessity means that going to the war ceases to be an adventure of any kind.

Yet in all this we must not overlook the glorious records of medical men upon the field of battle. In every campaign there are naturally countless acts of bravery and of devotion to duty in attending the wounded that have received no official recognition; for the work of the medical officer is done under less spectacular conditions than is that of the military man. We must not forget the fact, of which Dr. Laurence Duncan has recently reminded us (in THE MEDICAL JOURNAL OF AUSTRALIA of June 12, 1937) that since its inception in 1854 the Victoria Cross has been awarded to no less than thirty-six medical men, and that a doctor alone has received a bar to his original cross. In the unromantic welter of the Great War a dozen doctors were sufficiently outstanding, among those whose brave actions merited recognition, to gain the coveted cross.

It is doubtless true to say that the scope for adventure is growing less in the modern world; but thank heaven it is not yet exhausted. There is adventure still awaiting those who are willing to embark upon the quest.

That the medical profession is unique, in that it is protean in the ways in which it may be followed, should ever be in the minds of those who are called upon to give young people advice as to their choice of a career. Once a man has become possessed of a medical degree or of a registrable qualification, almost any mode of life is open to him. He may aspire to the city life of the fashionable consultant, or he may be drawn to the simplicity of life in the country. He may prefer the shelter of institutional routine, or look forward to the struggle of competition in industrial districts. He may care to be a soldier or a sailor—either road is open to him—or he may lean towards the mode of life of the civil servant. He may come as near to being a priest or a sportsman as fancy takes him, or he may devote his life to pure scientific research within the four walls of a laboratory. He may become an explorer, a pioneer, a criminologist, a naturalist or an administrator, and be well paid for living the life of his own choosing. A thoroughly incompetent lawyer or a hopelessly inefficient engineer could not look forward to a very successful professional career; but a medical graduate, who would certainly be a conspicuous failure in the active practice of his profession, may yet have happiness and a competence, and attain to considerable repute in one of the many scientific bypaths that are open to him.

If these facts were stated as applying to some hypothetical profession, or if it was asserted that the obtaining of a certain university degree enabled a man to do any of these things at his pleasure, surely youth would agree that this way lay adventure. The degree should be as a talisman. The academic course should be taken up as a quest for the Holy Grail. Every youth entering on his studies should be as a knight in armour, seeking his charter to adventure. Yet I fancy that even the most enthusiastic teacher engaged in the instruction of medical students will be forced to admit that he sees but little evidence of this spiritual quest or of the spirit of adventure among those who pass as an endless stream through his class-rooms and laboratories. I have long since given up regarding the general run of medical students as being in any way like knights in armour, for I have come to the conclusion that family tradition, parental influence and the desire to make money in a respected profession are far stronger influences than is the quest of adventure.

To hold this opinion is not to deny that in every generation of students that pass annually through our medical schools there are a few to whom money and reputable social position are no great lure. There are the few who are not starting their careers because the practice of medicine is a family tradition or because parents have decided upon this particular walk in life for their son to follow. Some are embarking on the course because they have a genuine call to help the sick; some because their love of science impels them to take up the one

scientific career in which they are reasonably certain of obtaining a competence. Some there are—but they are the few—who realize that a medical qualification will enable them to live a life of adventure; and by this term I do not mean that they are necessarily dreaming of the wild places of the earth, but that they have ideals of some more romantic setting for their lives than the fashionable medical quarter of their home town. Some few, maybe, still read the works of travel written by that older generation of surgeon-naturalists who lived in the brave days of real exploration, when much of the world was unknown territory. The race of medical men who were also seafaring naturalists is not dead even now, and, from Huxley of the "Rattlesnake", we pass by way of Cunningham of the "Nassau", Guillemard of the "Marchessa", and Alcock of the "Investigator", to Lowe's delightful book of the voyages of the "Zenaida". It is much to be hoped that the life of Wilson of the Antarctic will be an inspiration to medical students for many years to come.

But I am afraid we are bound to confess that no matter how high were the student's hopes of adventure upon entering on the medical course, the number of potential adventurers is considerably reduced after the ceremony of the conferring of degrees has been performed. Though it might seem that the obtaining of a medical qualification provided the means of adventuring in life, it is, alas, all too often regarded merely as a passport to a dull, but certain, routine of money-getting in the graduate's home town. It is depressing to discover that nearly every good student, in the later years of his curriculum and at his graduation, has as his ideal the affixing of a brass plate to the door of one of the professional rabbit-warrens in the fashionable medical street of the capital city wherein he had his training. To achieve this end he is prepared to make sacrifices by way of being crammed still fuller with details of the professional curriculum in order that he may write more or higher-sounding letters after his name. He is even prepared to go overseas to suffer still further cramming and to acquire more authoritative or more exotic professional badges as the tourist who sticks the labels of foreign hotels upon his trunks.

It is a regrettable fact that there is a tendency for most of our best-equipped graduates to look upon practice in even the larger provincial towns as a career to be entered on only as an unavoidable necessity when the period of waiting for practice in a capital city cannot be faced. Still less are they inclined to go to country towns even when these are the centres of large populations scattered through the surrounding rural districts. A great many of the purely professional problems that are at present of very pressing reality in Australia would be capable of solution if only well-equipped men, or teams of men, were willing to go further afield and adventure into regions more remote from our university towns. It is perhaps a fortunate thing for Australia that, at a time when it is difficult to find well qualified young medical men willing to apply for posts in the army, the navy, the public health services or in the mandated territories, there should be what might almost be termed a boom in "flying doctors". As a high adventure in the service of mankind, the life of a flying doctor should make strong appeal to the youth of the medical profession.

Even if we are forced to realize the regrettable fact that the modern university curriculum tends to thrust into the background any natural and healthy ambitions that the undergraduate may have for leading a stirring and romantic life, we must remember that it is the main business of the university to provide him with an alternative and a better form of adventure. All may not, in these later days, aspire to actual physical adventure; and the pity is that our students do not realize, nor, alas, are we even attempting to make them realize, that mere physical adventure is a pale and colourless experience compared with that real spirit of intellectual adventure with which we ought to inspire them. Physical adventures, brave deeds and romantic doings are for the young, the strong, and for those who are in some degree free from the more urgent ties of our social fabric; intellectual adventure waits upon everyone who has the enterprise to embark upon its quest. And yet how few ever undertake it!

In every healthy child there lurks the germ of this, the most characteristic of all human strivings. Every child is imbued with the desire to find out and to know. The small boy who takes his first mechanical toy to pieces, or who asks his parents embarrassing questions concerning his own origin, is eager to undertake the most exciting of all life's adventures—the voyage of intellectual discovery. It is not, perhaps, unnatural that his parents should suppress his desire for dissecting watches, nor that they should damp his enthusiasm for asking embarrassing questions, but happily, in most children, the desire for intellectual adventure outlasts these early rebuffs and persists well into the school age. This is neither the time nor the place in which to embark upon a discussion of the modern educational system as it is carried out in our schools; but I think it is fair to say that, in the case of the average child, the spirit of intellectual adventure into any of the subjects embraced within the routine school curriculum is to a large extent stifled. It is a fortunate thing that many children retain an interest in matters not included among the subjects taught in our schools. A distinguished medical man once confided to his former teacher that his whole career had been shaped by the fact that, since neither his parents nor his school teachers seemed to be able to enlighten him as to the origin of babies, he had resolved to solve the business for himself. Many a child has had the flame of his spirit of intellectual adventure kept burning by the keeping of silkworms or tadpoles, by a visit to a museum or an art gallery, or by some strange happenings for which there was no ready explanation. But we must, I think, admit that the spirit of wonder and of inquiry has, as a rule, become a little damped at the end of the normal

period of school life. Many facts have been taught to the young scholar; his appetite for learning has been satiated by the mass of assorted knowledge with which he has been crammed; he feels, perhaps, that it would be wise in future to refrain from hankering after further intellectual adventure, lest his quest result in a further attack of intellectual dyspepsia.

We are able to contemplate the results of more than half a century of free, compulsory and universal education in Australia. It is impossible to assess the range of intellectual adventure to which this education has led; but it is open to the cynic to form a very pessimistic opinion of the intellectual questing displayed by the recipients of this welter of teaching. Doubtless the boy has benefited by the system of his schooling to the extent that he remembers the more easily the life stories, the records and the prowess of athletes in various types of sport. The man has probably gained in his ability to retain in memory the details of the pedigree and performance of race horses and the fluctuation in the prices of primary products. The habit of acquiring a store of miscellaneous facts is easily established and is long retained; but an attitude of doubting, of questioning and of seeking after truth seems to be but rarely acquired as a result of our educational systems.

I think it may be said with truth that the first half-century of universal school education has produced few original thinkers, few rebels, few seekers after truth in the general mass of the "educated" population. For those who concern themselves in any way with the problem of education there must always be the depressing feeling that somehow it fails in its object. It is obvious that if a man would undertake intellectual adventure he must have some leisure wherein he may quietly pursue his quest. It is easy to say that the general population is too occupied in its daily routine to attempt to form its own opinions, and that it must therefore take them, as it took its school teaching, ready-made. But in Australia it is not so much that the leisure is lacking; it is that the willingness to undertake the intellectual adventure is absent. A universally literate population is doubtless a triumph for universal free education; but a population that is prepared to accept its every opinion ready-made from the printed page is surely not a wholly desirable factor in democracy. If this be the result that our present educational system is producing, it is high time a corrective were applied; for it would be easy to instance several races of mankind which, though held in some contempt by Australians, could justly boast that the average adult, literate or illiterate, has a far wider æsthetic experience in intellectual adventure than has the average educated Australian.

Even if this undesirable result appears to be the almost inevitable outcome of our present system of school education, it is a fortunate thing that what should be the natural remedy is today within the reach of most young people. For the natural antidote to the indigestion caused by school cramming is the university—the real university. The school master is, by the very nature of his office, not expected to be embarking upon any particular intellectual adventure on his own account, and, even if he is so engaged, he can hardly be expected to take his immature scholars upon the quest with him. But I would lay it down as an inflexible rule that no teacher should find place upon the staff of any university unless he be actively undertaking some intellectual adventure and that, moveover, he is able and willing to take volunteers along with him upon the expedition. If our universities cannot provide this stimulus for the mentally jaded, and intellectually surfeited, young scholars who seek their help, they are failing in their only important function. In the ideal university the professor should be the leader of an expedition into the most exciting and most romantic of all regions—the region of the intellectually unknown. The members of his staff should be his officers, who with him seek to insure that the equipment of the expedition and the plan of campaign are adequate for the successful carrying out of the enterprise. His students should be his eager followers, prepared to share in the hardships, the excitements and the triumphs of the adventure. The wonder of the child who bred silkworms should be aroused again; the enterprise of the child who dissected the clockwork toy should be reawakened. They should be encouraged to go afield, campaigning adventurously with those who can help them on the road. Can it be justly claimed that our Australian universities are providing the antidote that seems to be so necessary for a school education, which consists in the routine teaching of a certain range of detailed facts? Or are they, perhaps, only carrying on the melancholy business to further stages? This question must be answered one way or the other before long; and it must be answered very frankly.

Changes are taking place with some rapidity in the educational life of the country, and these changes may easily determine the ultimate fate of our universities. More and more, governments and institutions are becoming alive to the necessity of conducting research into Australian problems. Money is becoming more freely available for research into scientific, industrial and medical problems as they are presented under Australian conditions. Where and by whom are these researches to be undertaken? In general, it is true to say that research may be conducted in the departments of our universities, or it may be carried out in special institutions devoted exclusively to this end.

If research is to be conducted in specialized institutions, the initial advantage will be that the staff, being freed from the routine burden of teaching students, may devote the whole of their uninterrupted time to the problem in hand. At first sight this would seem to be so great an advantage that no other consideration could possibly weigh against it; nevertheless, I fancy that what may be termed "cloistered research" suffers from certain

handicaps. It is essential that a man who concentrates his attention upon even the most circumscribed and self-contained problem should have available the advice and criticism of men whose professional subjects impinge in any way upon his particular field. Such criticism and advice are readily forthcoming from colleagues in a university, though they may be difficult to come by in a research institution. Again, it is most desirable that any man who conducts research should at intervals clarify his ideas and mark the stages of his progress by communicating his results to others. Research divorced from teaching is apt to degenerate into an academic routine from which the element of reality is lacking. There is no more healthy stimulus to the true research worker and no factor that can more surely guarantee the soundness of his methods and of his reasoning than a body of interested disciples to whom he can communicate his intellectual adventures and who are prepared to share the adventure with him. It is, I believe, the most cogent criticism of the modern tendency to relegate pure research work to non-teaching institutions, that the general run of university students are deprived of that stimulus of intellectual adventure, which alone makes university education a real preparation for intellectual life.

Much has been said in Australia concerning the duty of the members of the staffs of our universities to make contributions to the sum of human knowledge. The theme is a familiar one in all the speeches delivered annually at our graduation ceremonies. It is regularly included in the repertoire of every deputation that waits upon any State government in an attempt to secure endowment for our universities. The thesis has so often been dwelt upon with conviction in public pronouncements and by the Press that it has become widely accepted that considerable additions to the sum of human knowledge are constantly being made by the occupants of professorial chairs in Australia as the result of researches conducted in their departments. To a certain extent this belief is justified. No one could possibly deny that many contributions of very real value have emanated from the various schools of our universities. It is, however, open to doubt whether these researches have been carried to a successful conclusion because of the conditions prevailing in our universities or in spite of them. It matters but little whether we agree upon this point or not; for we shall all be forced to admit that, even if in the past the conditions prevailing in our universities tended to encourage research, those conditions have practically ceased to exist today.

To admit this is to admit that a very serious disaster has overtaken the progress of intellectual adventure in Australia. It is probably only the professional teacher who appreciates to the full the profound difference that there is between the whole outlook of the student, whose most receptive years have been passed in a university in which the staff is actively engaged in research, and the outlook of a student whose training has been confined to an institution devoted solely to teaching. On the one hand is the student whose whole outlook is that of a member of a team, composed of professors, lecturers and students, engaged in the exciting quest of intellectual adventure; on the other is the stuffed and surfeited individual, devoid of intellectual curiosity. The one will be the life-long student, who will always know the keen delight of intellectual exploration; the other is a student only until the time when his stored-up but unassimilated mass of facts has been regurgitated in sufficiently good order to gain a degree or a diploma.

The university in which an original quest after intellectual adventure is being undertaken in its schools is the nerve centre of the intellectual life of the community in which it is situated. It will be the source of generation after generation of young men and women who will enter upon life and citizenship, eager to undertake intellectual adventure in any walk of life that may fall to their lot. It will be the fountain-head from which will flow an endless stream of young minds, ready to question, to examine and to criticize the condition of things as they find them and willing to search for remedies when remedies are needed. The university whose sole concern is the further teaching of individuals past school age can hope to achieve but little more than a standardized and mass-produced product. Its degrees imply no more than that the graduate is certified to have attained to a requisite standard of proficiency in remembering for a defined period a prescribed range of assorted dicta upon some subject or other. It is only by mere chance that, despite the system, anything other than an uninquiring individual, devoid altogether of a desire for intellectual adventure, will emerge from the academic ordeal.

If research is not to be a part of the regular activities of the teaching staffs of our universities, two results will surely come to pass: first-class men will not seek office in our universities, and a mass of mediocre and unthinking graduates will encumber the field of intellectual life in Australia. It is time that Australia made a choice in this matter. Are we to have research institutions in which a few workers will devote their whole time to our problems? Or are we to make it possible for the staffs of our universities to conduct research in our university departments?

If we select the first alternative, there is, no doubt, a probability that some of our outstanding problems will be capably dealt with; but the solution of the problems will be provided for the world ready-made, and our students will never have had the intellectual stimulus of taking any part in the exciting stages of enquiry that led to the ultimate solution. The young Australian student will not have shared in the intellectual adventure, and the ultimate finding will constitute only one more dictum to be added to his mental burden. No doubt we could get many of our problems solved by the liberal endowment of cloistered research institutions, but we should do it at the expense of those

eager minds that await inspiration in our universities.

If we select the second alternative and, by reducing the burden of teaching and administrative duties, make it possible for real and continued research to be undertaken by the staffs of our universities, we shall, I think, achieve much that is of pressing importance in Australia. We shall be able to attract first-class men to our universities, and we shall beget generations of students who conceive themselves to be part and parcel of a real organization for undertaking original work. Inquiry will be undertaken by the many, and all over Australia, and into every department of learning, instead of by the few, and into circumscribed problems only.

Surely this is the most desirable result that can be achieved by expenditure on education? And to achieve this end no mere endowment of research, however well intended, can ever be effective. It is useless to endow research if the research worker is not at hand, or if, being at hand, he has no sufficient time at his disposal in which to conduct research. The problem is a domestic one for governments and universities and for those who are able to provide endowment funds. Its solution lies in providing sufficient staff and equipment in our universities to guarantee that the research worker shall have ample facilities for conducting research, and at the same time shall be able to train the students in his department. In this way only shall we be able to attract first-class men to our university chairs and be in a position to produce students who will go out into the world prepared to take up the quest of intellectual adventure in every walk of life.

That I have dwelt somewhat unduly upon research and the quest of scientific truth as representing intellectual adventure is due to my training and to my occupation, as well as to the fact that these observations are intended for a medical congress. Scientific research is, however, but one of many roads of intellectual adventure. There is no occupation in which any person may be engaged that does not offer similar possibilities for him who is prepared to take up the torch. Indeed, though scientific research may afford some of the most exciting of intellectual excursions, the quest itself may be more the outcome of mere interested curiosity than the offspring of a real delight in intellectual exercises. The writer, the poet, the artist and the musician must all be imbued with the spirit of adventure if their work is to be in any way creative.

Such a statement is so commonplace that it would find no place here were it not for the fact that, though the world is prepared to admit that no artist can be great unless he has adventured far afield in intellectual quests, not every one would agree that, in a democracy, no man may be a good citizen unless he, too, is ready to undertake intellectual excursions on his own account. The one proposition I believe to be as true as the other; and I imagine that no democracy can be considered to have attained to anything like maturity until its educational system has succeeded in producing citizens who are willing to think, as distinct from those who are prepared to submit to the process of being taught.

No race, no people, no nation has ever become mature, let alone great, unless during its career it has had the hardihood to face physical adventure, and unless, when the days of physical adventure were perchance upon the wane, it has had the greater hardihood of embarking upon intellectual adventures. Even this degree of greatness will never be achieved if the spirit of adventure is confined to the few and is not shared in by the common run of men.

If in this light we review the story of nations or the lives of men, I think we must still own that the last word has not been said. Something is still lacking. True greatness did not come merely from a readiness to embark upon adventures limited to physical and intellectual spheres. There still remains one last quest that every nation which has become great and mature has undertaken, one last adventure that every individual who would aspire to see life steadily and see it whole must be prepared to undertake. No greatness, national or individual, may be attained in the absence of spiritual adventure. It is not enough that we should aim at so ordering things that we may imbue our young people with a love for excursions into the realms of pure intellect. The quest for truth, the pursuit of ideals, the love of beauty, and the striving for a mellowed humanity in our ethical relations with our fellow men are all part of that great quest for spiritual adventure which everyone must enter on before it can be said that life has been lived to the full.

It is, perhaps, a necessary part of human progress that physical adventure must ever be becoming a decreasing factor in shaping the characters of young people. The change from stirring adventures and chivalrous enterprises to the development of outstanding cunning or especial aptitude in some form of sport is probably an inevitable one. It is apparently an unavoidable outcome of our present system of education that the love of intellectual adventure persists only in the few who have passed through the stages of educational initiation in Australia. The remedy for this state of affairs is within our reach, though its attainment will doubtless be long delayed.

The last great lack, beside which the others are trivial, the lack of willingness to embark on spiritual adventure, is, I believe, the greatest factor in the problem that faces those who are responsible for the training of modern youth.

It would be tiresome to attempt to assess the relative importance of the modern influences that are playing their parts in producing this stifling of spiritual questings; it would be presumptuous to suggest a remedy. Yet I think it may be permitted to a teacher to wonder at times if even this thing might not emerge from our schools and our

universities if only we have the insight to appreciate the whole needs of our young people and the courage to attempt to satisfy them. It is not until we have attained to this that those young people who have passed through our educational institutions may be said to be entering upon life equipped to live it to the full. We cannot hope to rank as truly great among the nations of the earth until the matured and mellow individual, prepared to undertake real spiritual adventures and ready to live his life fearlessly in accord with his ideals, becomes a dominant factor in our social fabric.

THE ROLE OF PHYSIOTHERAPEUTICS IN THE TREATMENT OF THE PARALYSED.

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IT is acknowledged that treatment forms but a small part of the armamentarium of any neurologist and that this deficiency is due mainly to our ignorance of many of the ætiological factors operating in the various disease processes involving the nervous system. In these circumstances most of the therapeutic measures resorted to are of an empirical nature, and even then they are, at the most, merely symptomatic; but the employment of empirical measures is sound only providing they are known to produce beneficial results. If, however, they are applied in a haphazard manner and the results are not surveyed so that their value may be assessed, then much time and effort will be wasted in an unprofitable manner and little advancement in our knowledge of therapeutics can be anticipated. If this field is to be extended and improved, it is essential that the principles on which any particular form of treatment is based should be fully appreciated at the outset, and that, in the event of failure, the case and the treatment should be carefully analysed for a satisfactory explanation. Only in this way will the gaps in our knowledge be bridged.

Before the treatment of any neurological condition in the recovery from paralysis is planned it is essential to know, first, what is causing the paralysis, and, secondly, what results are to be expected when a particular form of treatment is adopted. Physiotherapeutic methods in the treatment of paralysis are sometimes prescribed too hastily, and so it is desirable that the physiotherapeutist should fully appreciate exactly at what he is aiming and the limitations of his subject's powers. Sound therapeutics must necessarily be based on a detailed knowledge of the structure and function of the unit that is at fault, in this case the motor system. Unless due regard is paid to these essentials, early optimism with regard to treatment will not be sustained.

In this paper the term physiotherapeutics is used, in its broadest sense, to include any agent of a physical nature employed to aid recovery from paralysis which may be complete or incomplete. The paralysis will also be regarded as that particular disorder of the motor system which is characterized by weakness or complete loss of voluntary movement, following damage to the motor cortex or its efferent pathways. Consideration of the relative merits of any particular physiotherapeutic methods is assumed to be beyond the scope of this discussion.

It is proposed first to outline the main anatomical features of the motor pathway, then briefly to discuss its function, and finally to consider the disturbances which follow its disordered action, and the results that may be expected from the application of physiotherapeutic methods of treatment.

Anatomical Features.

Situated in the anterior horn of the grey matter of the spinal cord is the anterior horn motor cell, which gives origin to the motor neuraxone. This process issues from the cord by way of the anterior spinal root, and then passes along a peripheral nerve to enter finally a striped muscle, where it terminates in a specialized motor nerve ending which brings it into intimate association with the muscle fibre. To reach the end station in the muscle any motor impulse must pass along this pathway, for there is no other available route. This pathway, then, is the final common pathway of the motor system, and any efferent centre higher in the neural level which is to influence it, must act on the anterior horn cell. What systems are there, acting on the anterior horn cell, that can influence the resultant composite impulse passing outwards along its neuraxone? Briefly, there are two main systems operating in this manner. First, there is the pyramidal system operating by way of the pyramidal tracts, which is associated with voluntary movement; secondly, there is the extrapyramidal system, whose fibre tracts pass down the cord to the anterior horn cell along motor pathways other than those of the pyramidal system.

It is intended to limit this paper to a discussion of the paralysis following on damage to the first system outlined, the pyramidal tract system. The units of the extrapyramidal system, the rubrospinal, vestibulo-spinal and tecto-spinal tracts, are all concerned more with posture and tone than with actual voluntary movement. Disturbances of movement following on lesions involving the extrapyramidal system form a small but important group of cases which must be left for future consideration. The part played by the sensory apparatus in the correct functioning of the motor system is also acknowledged, but disturbances of voluntary movement following on sensory upsets will also be omitted from this paper.

The fibres of the pyramidal tracts take origin from only a limited area of the excitable cortex. Recent experimental work by Foerster and others has

shown that the excitable cortex is far more extensive than was originally thought, and that only part of it relays to the cord by way of the pyramidal tracts. Foerster has shown from stimulation of the human brain that the excitable cortex extends over the cyto-architectural fields outlined in Figure I, the classification of areas being that advocated by Vogt. Directly anterior to the *sulcus centralis* is that part of the precentral convolution which has been designated Area 4. The important physiological properties of this anatomical area are, first, the focal subdivision that occurs there, secondly, the overlapping of adjacent foci, thirdly, the low threshold of excitability, and, fourthly, the representation in one particular focal area of the corresponding ipsilateral and contralateral sides of the body.

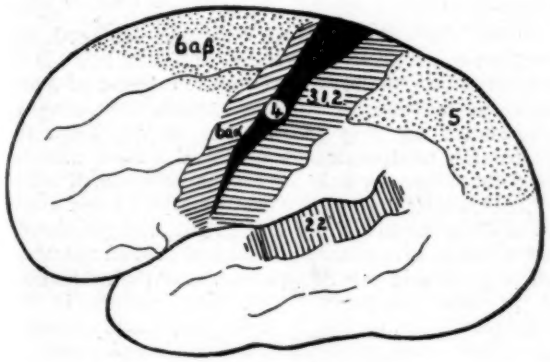

FIGURE I.
The excitable areas of the cortex. (Modified from Foerster.)

In Area 4 the various parts of the body are represented in a definite field, and, moreover, this motor pattern is one of movements and not of individual muscles. Those parts of the body possessing the greatest range, variety and niceties of movement receive the greatest representation. Thus the area given over to the hand is very extensive and far exceeds that allotted to the foot, whilst each individual finger can claim its own separate focus. Moreover, in this focal subdivision the area for one finger will overlap that for its neighbouring digit, so that in one focal area a particular segment is represented not exclusively but predominantly. Foerster's observations also support the view, originally expressed by Hughlings Jackson, that each side of the body is represented in both hemispheres, and this has been confirmed by the recent experimental work of Fulton and others. This applies not only to muscles acting bilaterally, such as those of expression and respiration, but to the majority of, if not all, muscle groups. This fact becomes of considerable importance when the question of recovery following on cortical damage is discussed. The degree of ipsilateral representation varies. Muscle groups acting bilaterally are the most bilaterally represented, and bilateral effects will follow weak stimulation of the corresponding focus in one hemisphere. But, with a stronger stimulus, almost any excitable cortical focus will give a bilateral response, which, in the case of the extremities, is easier to obtain in the proximal than in the distal segments. The finer skilled movements, such as those of the fingers, are the least bilaterally represented.

Of the other regions, Areas 6aα and 3, 1, 2 give, on stimulation, results similar to those obtained from Area 4, but here the strength of the stimulus required to elicit a response is greater than in the case of Area 4. Moreover, in the case of these two excitable areas, the results are due to a spread of current to Area 4 by superficial cortical pathways, from which field they are carried to the cord and to the anterior horn cell by the pyramidal tracts. Thus when Area 4 is destroyed or the pyramidal tract is interrupted, stimulation of Areas 6aα and 3, 1, 2 is no longer followed by a peripheral motor response.

A second type of response can be elicited from these two areas, which is similar to that obtained from the remaining excitable areas, namely, 6aβ, 5 and 22; here the result obtained by stimulation is mass movements of the contralateral half of the body. The head, eyes and trunk are turned to the opposite side, and the limbs exhibit movements of a complex nature; the arm is abducted, the forearm flexed and pronated with the fist open or closed, whilst the lower limb is simultaneously flexed at the hip and knee and dorsiflexed at the foot and toes. This combination Foerster calls the flexor synergy. The second type of mass movement obtained he calls the extensor synergy: the arm is adducted and extended, though still pronated, whilst the hip and the knee are extended and the foot and toes are plantar flexed. In the case of Area 5 additional movements on the ipsilateral side are to be observed. The efferent pathway of this system does not follow the pyramidal tract, but employs a pathway of its own, which involves subcortical centres before reaching the spinal cord and the anterior horn cell. Because their efferent pathway differs from that of Area 4, these excitable cortical regions have been grouped by Foerster into an extrapyramidal system. No details of the efferent pathway of these "extrapyramidal" cortical areas are given, except that they are said to pass through subcortical centres before relaying to reach the cord. Whether they are identical with the cortico-pontine fibres relaying in the pons, cerebellum and red nucleus before leaving the latter by the rubro-spinal tract is unknown.

When any focus in Area 4 is damaged to give a cortical monoplegia, for example, that of the arm, the affected limb passes through a series of phases as recovery proceeds. First comes the period of shock, which results in temporary flaccidity with loss of all reflexes. With recovery the tone of the limb improves, until it finally exceeds its former value, whilst the reflexes return and finally become hyperactive in the absence of the controlling influence of the cortical focus. Limb movements return, and at the onset are of the mass type. This is due to the fact that the extrapyramidal cortical

areas are operating in the absence of Area 4. Thus, attempts at abduction of the arm are always accompanied by flexion and pronation of the forearm, that is, attempted movement of a particular type results in the liberation of the complete flexor synergy. This, then, is the period of the compound synergies. With the lapse of time these synergies become modified by some recovery of the damaged area, if the damage is not progressive or complete, and by the compensatory activities of the ipsilateral cortical focus; both of these may be considerably assisted by reeducation at the periphery. Abduction of the arm can now be carried out independently of the previously associated flexion and pronation of the forearm. It is not surprising to find, however, that those fine detailed movements which show the greatest degree of localization and which are the least bilaterally represented never return; or if they do, they are grossly and permanently impaired. Thus individual finger movement is lost even if the ability to open and close the hand returns. If the lesion is in the internal capsule the collected fibres of Area 4 are damaged and the result is a hemiplegia as opposed to a monoplegia, and the compound synergies will now involve the entire side instead of one limb. If all fibres from the excitable cortex are destroyed in a capsular lesion, then no voluntary movement of even a compound type can be expected unless some recovery occurs.

Excision of Areas 6aβ, 5 and 22 singly produces no symptoms because of the ability of the intact extrapyramidal areas to function efficiently in the absence of one member of the unit. However, the importance of the part they play in the recovery of movement can be gauged by observing the changing clinical picture in a progressive lesion, which gradually involves and eliminates them after they have compensated for the loss of Area 4.

Experimental work on the chimpanzee by Fulton suggests that Areas 6a and 4 show functional differences other than those outlined. Area 4 he refers to as the "motor area", and he believes that its removal results in

> transient paralysis, most marked and enduring in the distal joints, transient depression of reflexes and transient flaccidity. In the stages of recovery from a lesion of Area 4 deep reflexes may become moderately hyperactive, but gross spasticity has never been observed at any age of recovery following lesions sharply restricted to Area 4.

Area 6a Fulton calls the "premotor area", and its removal is said to result in a disorganization of the more highly integrated voluntary movements, with

> the immediate appearance of spasticity with increase of deep reflexes, forced grasping, vasomotor disturbances and certain specific reflex signs, such as those of Rossolimo, Mendel Bechterew, Hoffmann, and the fanning sign of Babinski.

This syndrome, which has been called the premotor syndrome, is obtained only providing Areas 6aα and 6aβ are removed together or seriatim. These experimental findings have been unfavourably criticized, and no confirmation has yet been possible in man because complete excision of Area 6a, Area 4 being left intact, has not yet been carried out.

Any lesion involving the pyramidal pathway as far as, but not including, the anterior horn cell gives rise to an upper motor neurone lesion, which is characterized by the following signs: (i) increased tone, (ii) increased reflexes, (iii) mass movements if the lesion is cortical, (iv) very little wasting, and (v) no reaction of degeneration. The extent of the loss of function and of the neurological findings depends on the site, on the degree, and very often on the nature of the lesion. Any lesion between and including the anterior horn cell and the motor nerve ending gives the lower motor neurone type of lesion in which the affected part shows the following well-known changes: (i) diminished tone, (ii) absence or diminution of reflexes, (iii) weakness or loss of movement, (iv) wasting, and (v) the reaction of degeneration.

When the anterior horn cells are damaged, the resultant peripheral paresis or paralysis is a scattered one, for it involves muscle fibres of many different muscles in varying degree, according to whether or not they receive their supply from the particular cord segments damaged. Now muscles may function as prime movers, synergists, fixators or antagonists, and in the performance of any movement different muscles blend in the way previously described to give a harmonious and graded response. These properties are peripheral, and their blending to produce coordinated movement occurs in the cerebral cortex, so that it is the resultant completed movement which comes to be registered in consciousness and not the various components going to make it. Thus cortical destruction eliminates the entire pattern, whereas damage to the anterior horn cells may result in the removal of one of the units and so be followed by an impairment of movement only. But the cortex possesses one property which the cord lacks, namely, that of readaptation, so that, providing the anterior horn cells maintain their normal relationship, readaptation in the cortex, following reeducational measures, may once again lead to an organized control of the lower centres. This may explain why the outlook in certain cases of the cerebral palsies of children, with their powers of cortical readaptation, is better than that in certain cases of anterior poliomyelitis. On the other hand, if any unit of the pattern is disturbed in a cord lesion, then it is rather a peripheral muscle imbalance which results, and this produces a central derangement of the pattern, which gives rise to a disorganization of movement.

Is it possible to achieve improvement in a motor unit by calling on another muscle when one muscle is paralysed? Beevor investigated this problem and came to the conclusion that the evidence is against such a possibility, though long training and exercise or operative procedures may assist. Evidently the functions of the muscles and the order in which they come into action can be altered but little, though very often alteration may be made in the force of their action. By physical or mechanical means it is possible to grade the action of

unimpaired muscle groups in such a way that much can be done to restore the muscle balance and so to improve the range and precision of movement.

With the establishment of these fundamental facts a rational approach is now open to a discussion of the part played by physiotherapeutics in the treatment of the motor defects following on various lesions of the nervous system. The conclusions are based on an analysis of the results of treatment of patients in the neurological clinic at the Alfred Hospital, Melbourne, and I am indebted to Dr. L. B. Cox for permission to investigate the cases.

The Cerebral Palsies of Children.

There are many cerebral lesions giving rise to motor disturbances which call for, and may be greatly relieved by, treatment along physiotherapeutic lines. The first to be discussed will be the cerebral palsies of children.

Osler's concise outline of the nature of the cerebral palsies of children will bear quotation.

> The clinical picture presented by diseases of the upper segment is varied, depending partly on the nature, partly on the extent of the lesion: and while on certain grounds it would be preferable to classify and consider the affections on an anatomical or, perhaps better still, on an ætiological basis, we may, for clearness and convenience, adhere to custom and classify the cases according to the distribution of the paralysis, whether hemiplegic, diplegic or paraplegic. The cases are usually arranged under the generic term cerebral palsies—the German *cerebrale Kinderlähmung*—or spastic palsies, while the specific designation indicates the distribution of the paralysis, whether unilateral, bilateral or paraplegic.

The ætiological factors are multiple, though Osler stresses the importance of hæmorrhage, post-febrile processes and thrombosis of the cerebral veins. However, no matter what the ætiological factor, whether it be maldevelopment, trauma, inflammation or otherwise, the destructive lesion always involves the motor centres; the change following the initial onslaught is complete and not progressive, and in many cases the damage is irreparable.

When cortical areas are permanently damaged treatment would be of no avail but for the ability of the intact cerebral cortex to undergo readaptation which, in time, leads to some return of voluntary control; therefore, the spastic paralyses are never complete except in the grossest and most extensive lesions. At first the disturbance of movement is a disorganization rather than a complete loss, and this disorganization may be modified and recovery may be hastened by the application of reeducational measures which promote compensation by the undamaged cortical areas. In the young the modification of the compound synergies already outlined is not so clearly seen because of the absence of well-developed complex movement patterns in the cortex. In many cases, although the condition is present at birth or produced soon after, it is not recognized until the time arrives when the child should be commencing to walk and talk, and it is the retardation of these functions which may first arouse suspicion. When the paralysis is established, the nutrition of the part may be maintained by massage and the application of warmth, but it is best maintained by the promotion of a return of function to the part by means of reeducational exercises. In general, recovery, when it does occur, is most complete in the leg, less complete in the face, and least complete in the arm, and in the experience of many the leg and face recover very well even in the absence of any treatment. The degree of recovery will obviously depend on the site, on the nature and on the extent of the lesion.

It is to be remembered that the ability of the intact cortex to compensate is definitely limited, though to an unknown degree, so that a stage will ultimately be reached when a continuation of reeducational measures will be of no benefit. There are few who could spare the time for and bear the expense of prolonged treatment even if it were indicated. How long should treatment be continued? In general, it may be concluded that treatment should be persevered with so long as the child's condition continues to improve. At the same time, it must not be forgotten that, although the potentialities for improvement are present, it may often be interrupted, arrested or retarded by the coexistence or appearance of accompanying mental deficiency or contracture formation. One of the great bars to efficient treatment is the lack of cooperation that is met with in many patients. Here the damage to the brain has not only ruined important receptive and correlation areas, but has occurred at a time when education and experience should be preparing the way for intellectual progress. The intact areas are unable to compensate for the loss, with the result that mental deficiency now complicates the motor defect. Apart from any inability to cooperate in treatment, these patients never get that general exercise which is so essential for the natural and continued development of the motor side of the neuro-muscular mechanism. Mental training is essential for these patients if only to assist in reeducation of the faulty neuro-muscular apparatus. Many of these severely affected patients progress to such degrees of deformity that mechanical and surgical measures are necessary for the relief of the inevitable rigidity and contractures. Such measures may convert a bedridden into an ambulatory patient.

Concerning the duration of treatment in mentally handicapped patients, it has been suggested that intelligence tests should form a guide. If at the end of twelve months the tests reveal an improvement or indicate that the patient has maintained his position, then treatment should be persevered with; if, on the other hand, the patient has lost ground, then treatment should be discontinued. The recovery of function may, however, be interrupted by the appearance of contractures due to muscle imbalance, which is brought about by a hypertonic condition of the muscles. This imbalance prevents that natural exercise which is so essential if improvement is to continue. Reeducation is handicapped by contractures and they must be eliminated

as far as possible by physical or mechanical means. It is in the milder cases, when cerebral function is good and the degree of damage to the motor system small, that the greatest amount of benefit can be expected from treatment; here reeducational methods designed to restore muscle balance and to reorganize incoordinated movements can with advantage be persisted in for as long as the patient continues to show improvement. At this stage it should be noted that the use of electricity, except for the production of heat, is definitely contra-indicated in all lesions of the upper motor neurone type. No further reference will be made to this point.

Vascular Disturbances of the Cerebral Hemispheres.

Occlusion of a cerebral vessel by emboli or by thromboses is followed by changes in the cerebral tissues supplied by that vessel, which will lead to the impairment or loss of their function. The possibilities of recovery from the paralysis following involvement of a motor area depend on five factors. They are: (i) the amount of damage to the motor centres, which in turn depends on the size of the vessel and on the site of the occlusion; (ii) the nature of the vascular lesion; (iii) whether the condition is progressive, stationary, or likely to recur; (iv) the degree of recovery of cerebral tissues by the establishment of a collateral circulation or from the subsidence of œdema about a damaged focus; and (v) the opportunities for the employment of reeducational methods.

Before treatment is commenced the patient must have recovered from the acute phase of his illness. Again, before any treatment of a physiotherapeutic nature is considered, one must be reasonably certain that the pathological process is not progressive, for not only may further vascular changes be precipitated, but to attempt any muscle reeducation in the face of such a lesion would be unavailing. The condition must be stationary and not progressive if treatment is to be of any avail. In the acute flaccid stage efficient splinting and gentle massage are indicated to prevent the early appearance of deformities and to maintain the nutrition of the part. Contractures must be prevented at all cost, because a paresed muscle which might still contract voluntarily, if assisted, will certainly be rendered useless if it is restricted by the appearance of contractures. With the first return of voluntary movement the patient should be encouraged to increase it by exercise. If the lesion is a cortical one and the result is a monoplegia, or if the internal capsule is the site of the lesion and the result is a hemiplegia, then reeducation of the flexor and extensor synergies is to be aimed at once these have appeared. Continuation of treatment will, as already intimated, depend on whether the condition is progressive or non-progressive, or on whether it is latent and likely to recur. No more improvement is likely to occur after two years of treatment even in the most suitable subjects, and generally, if there is to be any improvement at all, the optimum of recovery is reached long before this time has lapsed.

What is to be expected from physiotherapy in the way of recovery of muscle function? First, little in the way of individual finger and toe movement is to be anticipated unless the lesion is cortical and very small and localized. Even wrist and ankle movements, although improved, will be definitely and permanently impaired. But much can be expected of the larger joints, such as the shoulder, elbow, hip and knee, and it is remarkable to what extent function will return in these parts with efficient treatment even when a considerable time has elapsed since the initial damage. Return of some power in these joints, with an increase in the range of their movements, is always appreciated by the patient.

Cortical Ablations.

Removal of foci in Area 4 for epileptiform Jacksonian seizures due to post-traumatic focal scarring is not a frequent operation in this country. When a cortical motor area in Area 4, for example, that of a limb, is ablated, the limb passes through the various phases already outlined. Reeducation and modification of the compound synergies will very often lead to a most satisfactory result. It has been stated that the employment of these methods is contraindicated, because under such treatment any residual epileptic state is apt to be aggravated. Despite this warning, reeducational measures were adopted in one case with no untoward effects.

The patient, in whom post-traumatic focal cortical scarring had resulted in Jacksonian attacks involving the right side, particularly the arm and leg, was subjected to operation overseas and the cortical scarred area was excised. Since the operation the patient has had intermittent epileptiform attacks involving the right side as far down as, but omitting, the leg. These attacks have been controlled by the administration of "Luminal". When first examined the patient exhibited complex movements of the arm and leg, but these have been modified to such an extent that his walking has improved considerably, although the condition of the upper limb has remained *in statu quo*.

The author has not yet had the opportunity of examining a patient with paralysis of a limb following removal of a cortical area for tumour involvement in whom the prospects of continued life warranted attempts at reeducation to aid restoration of the functions of the paralysed limb. Such a condition, however, is by no means impossible. Should the tumour be of a favourable size and be as completely and as efficiently removed as possible, then it is fair to say that any motor defect would be lessened by the use of reeducational methods.

Disseminated Sclerosis.

The motor disturbances in disseminated sclerosis or in Schilder's disease are in no way reduced by physiotherapy, chiefly because the conditions are progressive and the termination is always fatal. The motor defects in disseminated sclerosis require perhaps a little more attention.

In this disease the initial change apparently occurs in the myelin of the central nervous system,

which gradually disintegrates. The plaques of degenerated myelin so formed are subsequently sclerosed, and the axis cylinders passing through the plaque are caught and strangled in the scarred patch. These plaques are scattered throughout the central nervous system, but it is only those which involve the motor pathways that produce disturbances of movement. The disease, although characterized by remissions and exacerbations, is unrelentingly progressive, and the course is in no way influenced by any known form of treatment. In these circumstances it can be quite readily appreciated that any form of physiotherapy is not likely to accomplish a great deal. Some maintain that it is of value in the very early stages of the disease and in the young, when remissions are usually, but not invariably, to be expected, and that in this way the motor apparatus can be kept in readiness for a remission in which its activities will be temporarily restored. However, although it has been found most desirable to keep these patients ambulatory for as long as possible, physiotherapeutic methods do not appear to assist, for experience has shown that such methods are without even subjective value and that they definitely tire the patient. They may be given a trial, but should not be continued unless the patient feels that he is deriving some relief from them. On occasion the use of mechanical devices will correct deformities and aid or permit such activities as walking.

Traumatic Injuries of the Spinal Cord.

After complete or incomplete anatomical division of the cord no recovery distal to the lesion is possible, and all that can be accomplished is the prevention or the delay for as long as possible of the appearance of uncomfortable contractures. Active measures are definitely contraindicated because of the painful flexor spasms to which they give rise, and the chief aim should be to diminish this spinal irritability. If the interruption of cord function is physiological, then in the acute phase rest and splinting are the only treatment required, whilst in the later stages massage and exercises will assist the return of function.

Transverse Myelitis.

The pathogenesis of transverse myelitis is in many cases unknown, but the disturbance is probably of an inflammatory or vascular origin and any region of the spinal cord may be involved. In the acute stage, when the cord below the lesion is in a condition of spinal shock, splinting and rest are the only forms of treatment indicated, but, with the first appearance of signs of recovery in the damaged areas of the cord, this expectant treatment should be replaced by more active measures, and massage and exercises will accelerate recovery in the neuro-muscular apparatus. If there is any permanent cord damage, then the resultant paralysis cannot be remedied, and physiotherapy is of most value in avoiding contractures and in restoring muscle balance.

Syringomyelia.

In syringomyelia, glial changes occur in the vicinity of the neural canal, and degenerative changes in this glial mass are followed by cavity formation, or the cavity is formed from a nest of ependymal cells, which are derived from the ependymal layer of the developing cord. The regions of the cord usually involved are the cervical and lumbar regions, and the pyramidal tracts and anterior horn cells in the vicinity are usually pressed on by the cystic mass or are ultimately involved in the glial formation and subsequent sclerosis. These changes are slowly progressive. As long as the cavity is large and compresses adjacent tracts, treatment for the relief of motor disorders is useless. Providing, however, the cyst can be opened and drained and the pressure relieved, physiotherapeutic methods are of great value in assisting the return of function. The cyst, however, usually fills again and the patient relapses to his former condition. If no cystic cavity is demonstrated and the pyramidal tract involvement is due to a surrounding sclerosis, then nothing can be done to restore function. In other words, physiotherapeutics are useless in a condition which is definitely progressing.

Anterior Poliomyelitis.

In the condition known as anterior poliomyelitis, the damage to the nervous system follows an attack by a neurotropic virus, the site of election being the anterior horn cell of the cord. Most practitioners are familiar with this relatively common condition and with the excellent results that usually follow treatment. The reason for the rapid and complete recovery, which, fortunately, the majority of patients attain to, is that the life of the virus in the host is transient, and therefore the condition is non-progressive. Moreover, the damage to the cell need not necessarily go on to complete destruction, so that recovery from the initial damage is extremely likely to occur. Such a recovery phase may extend over a period of many months, and it is the preparation for and assistance given to this recovery that is one of the greatest rôles of physiotherapeutics. Active measures are contraindicated in the acute stage of the illness, when adequate splinting and rest in the position of function are most desirable, in order to prevent the stretching of weak or paralysed muscles, which, if allowed to, would assume an abnormal position. Complete rest is also indicated to eliminate as far as possible the harmful influence of peripheral irritation on the anterior horn cells. This treatment should be persisted in until the temperature has dropped and all pain and tenderness have been absent for about fourteen days. A complete examination, if the condition of the patient allows it, will then reveal the severity and distribution of the lesions. If the nature of the lesion, its site and its distribution are known, more active treatment can be commenced in about two to three months from the onset if in the interim the patient has been well. The chief peripheral defect is a muscle imbalance due to the

distribution of the lesion over various groups of anterior horn cells in the cord. Attempts are made to correct this by massage and by reeducational exercises in which the weak muscles are strengthened and the uninvolved hypertonic groups are stretched; in this way the muscle balance is restored, being continually aided by the slow recovery of the anterior horn cells. Contractures should be dealt with, if they are inevitable, in order to prevent their hindering recovery in other muscle groups. Despite all care and attention, treatment in the end may have to be supplemented by permanent splinting or by orthopædic reconstructions.

Progressive Muscular Atrophies.

In the group of diseases whose symptomatology is due to a slow, continuous destruction of the anterior horn cells are the progressive muscular atrophies. Here the pathological process, the ætiology of which is quite unknown, is characterized by the slow death of the anterior horn cell. The lesion in the cord is accompanied and followed by degeneration of the corresponding muscle fibres. Remissions are rarely, if ever, encountered, and no known treatment will arrest or retard the progress of the disease. If, on request, these patients are subjected to massage and exercises or to any form of physiotherapeutics, they invariably volunteer the information that the treatment in no way improves them, that it is actually tiring, and that they would prefer to discontinue it. Indeed, considering the pathology, it is far better that all fatiguing exercises should be avoided, for the only influence they will have on the wasting will be to increase it. Occasionally a mechanical aid for the foot-drop will assist the patient in walking.

Traumatic Lesions of the Peripheral Nerves.

Most practitioners are familiar with the symptomatology and treatment of peripheral nerve lesions, and these require no lengthy or detailed consideration. Splinting in the position of function, massage and reeducational exercises are the indispensable methods of treatment and determine the functional result, though the ultimate object aimed at depends on the particular nerve damaged as well as on the degree of injury.

This is one field in which electrical treatment has apparently justified itself. However, no method of treatment, whether electrical or not, in any way influences the regeneration of axis cylinders down the nerve segment distal to the lesion. Electrical stimulation is said to prevent the disuse atrophy which a muscle undergoes when it is deprived of its nerve supply, and this is accomplished by exciting the paralysed muscles to contract, thereby exercising them and preserving them in such a state that, when the neuro-muscular break is repaired, they are ready to resume their function. Such treatment must, however, be carefully applied, and only paralysed groups of muscles must be stimulated, otherwise normal muscles may be activated and contractures produced. This form of treatment, however, has not been unanimously accepted. There are many who prefer to rely solely on non-electrical measures, because the possibility of indiscriminate excitation of unimpaired muscles is thereby eliminated, and also because they are of the opinion that, even if a muscle has been out of action for a long period, it will reawaken to activity, no matter what treatment has been applied, once its nerve supply is reconstituted. But as Barstow states:

> If the electrical stimulation is correctly done, it must, I think, be of the greatest value, for the contracting muscles produce a true automassage of the part. Its effects are especially noticeable in the small muscles, such as the interossei, after an ulnar nerve lesion, in which the wasting can be kept to a minimum.

This is an observation with which one must agree.

Peripheral Neuritis.

Many ætiological factors are known to operate in the causation of peripheral neuritis, but the result is always an inflammation of the nerve elements, and the motor, sensory and autonomic components may be involved in varying degrees. When this inflammation subsides the function of the nerve which has been in abeyance returns. The chief types of the condition in which motor defects predominate are acute infective polyneuritis, diphtheritic neuritis and lead neuritis. In many types the paralyses are accompanied by sensory changes, chief among them being hyperæsthesia and pain. In the acute phase rest in the functional position is imperative, and this should be accomplished by splinting, which will also prevent contracture and deformity. In many cases the severe pain occasioned by movement will prevent any other interference of a physiotherapeutic nature; any active measures should be reserved until all pain and tenderness have disappeared. Gentle massage, if it causes no discomfort, is of value at this stage, because it aids the circulation and the nutritional changes, both of which are always impaired in a paralysed limb. With the subsidence of the acute condition, as indicated by the absence of pain and tenderness, and by improving neurological signs, more active measures may be proceeded with. Concerning pain, that which is due to adhesions calls for active treatment, whilst that which is due to inflammation of the nerve demands rest. It is essential, therefore, that the two types should be carefully distinguished, so that the too early or too late application of active measures may be avoided. Once recovery is progressing, massage and exercise will hasten the return of function.

Motor Disturbances Following Changes at the Nerve Ending.

Myasthenia gravis is a disease in which the passage of the nerve impulse across the motor nerve ending to the muscle is apparently impaired or abolished. It is characterized symptomatically by undue fatigability of the muscles which may progress to permanent paralysis. A theory which has found general acceptance has been advanced to explain the passage of the nerve impulse across the

gap between the nerve ending and muscle fibre. It is believed that the impulse, on reaching its nerve ending, liberates a chemical substance which is either acetylcholine or a substance closely allied to it. This substance then, directly or indirectly, promotes muscular contraction. Circulating in the blood is an esterase which destroys acetylcholine. In *myasthenia gravis* it is believed that this esterase is present in excess and that it destroys the liberated acetylcholine before it has time to cause contraction of the muscle cell. The only efficient treatment available at present is "Prostigmine" therapy, in which the administration of this drug is followed by the most dramatic recovery. Its action is to destroy or neutralize the esterase and so to leave the acetylcholine free to act on the muscle fibre. From an examination of the ætiology it is clear that the use of any physiotherapeutic measure is absolutely contraindicated; any procedure initiating unnecessary muscular contraction must be avoided, because it will only aggravate the condition.

Muscular Dystrophies.

The last unit in the neuro-muscular system to be considered is the muscle itself, and here the chief diseases met with are the muscular dystrophies. Included in this group are a number of types, namely, the pseudohypertrophic type, the Landouzy-Déjérine type, the Erbs juvenile type, the Charcot Marie-Tooth type, the Werdnig-Hoffman type. The line of demarcation between the various types is by no means fixed, and clear and transitional types have been described; for the purpose of this discussion they will be regarded as forming a single group. They are all familial in their incidence. The pathogenesis is quite unknown, but two theories have been advanced to explain the occurrence of the muscular dystrophies: the first theory regards the condition as a primary muscular degeneration, whilst the second looks upon it as "a defective tendency in the development of the germinal tissue which forms muscle". These two theories are important because they are responsible for two forms of treatment which are diametrically opposed. Since the former regards the condition as a degeneration, rest in indicated, whilst the second, looking upon it as a deficiency of development, demands exercise to promote development. Since the pathogenesis is so uncertain, very little can be advocated in the way of treatment. The main pathological changes appear to be a degeneration of muscle with its replacement by connective tissue, and on these grounds it would seem that rest and not exercise is demanded, so that physiotherapy can offer nothing in the way of treatment, but is rather to be avoided. However, although massage and exercise have their advocates, it can be definitely stated that, no matter what the treatment, it will not arrest the condition nor influence in any considerable degree the course of the disease. Splinting or operative interference may be ultimately required to control the inevitable deformities.

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IN WHAT POSITION SHALL WE PLACE THE FRACTURED LIMB?[1]

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PART I.

THIS paper has to do with the position in which the fractured limb should be placed. It is an elaboration of part of a previous paper on "A Series of Fractures Treated by the Methods of R. Hamilton Russell".(1) When the fracture is of such a nature that firm reduction is possible, the position of the limb is not of the greatest importance, as one fragment will control the other. When, however, the fracture is of such a nature that firm reduction is impossible, the position in which the limb is placed is of very great importance. Such fractures are oblique or comminuted or transverse fractures which cannot be reduced.

In any branch of surgery involving a number of different procedures it is a great advantage if some principle can be found which will apply equally to all these procedures. In this particular study of limb position is there any such principle? As a matter of fact, when the student first approaches this study he finds that most text-books do clearly define such a principle. This is, that if a fracture occurs in such a way as to separate a muscle group from its opponent, the muscles attached to one fragment will drag it into a certain position which apparatus cannot control, and in order that the other fragment may correspond, the whole limb must be placed in a similar position. An example of this is to be found in one of the first illustrations to Böhler's "Treatment of Fractures".(2)

Here the fracture is through the surgical neck of the humerus. The diagram shows the proximal fragment abducted and outwardly rotated, and shows how the limb must be placed in a corresponding position. This principle is easy to understand and seems reasonable.

At this stage the student will discover that there is still another principle which bears on the

[1] Read at a meeting of the Tasmanian Fellows of the Royal Australasian College of Surgeons, Hobart, November, 1936.

position of a fractured limb. This is that the position must be one that will permit the earliest return to function when the fragments have united. A good example of this is again the abducted position of the arm. Here not only are crippling adhesions prevented if the fracture is near the shoulder joint, but with the help of gravity function is regained more quickly than from the position in which, for example, the arm has been left hanging by the side. Another example of this principle, and a classical one, is the right-angled position of the foot. Function is regained more quickly from this position than from one in which the foot is in a dropped position.

Armed with these two principles, the student finds that he does well with the majority of fractures. Soon, however, certain doubts enter his mind. In the first place, although it is a matter of common observation that shortly after a fracture muscles can be seen causing deformity of the fragments, it is also a matter of common observation that when pain has been relieved and the limb supported this deformity disappears. Although, for instance, the deformity described for fracture of the surgical neck of the humerus can be seen just after the accident, if the arm is placed in a sling and the patient is made to sit down, the deformity soon disappears.

In the second place, when shortening of muscles is studied in other circumstances, for instance, in the presence of cut tendons and in the contractures of poliomyelitis, it is seen that muscle contracts slowly. When a tendon is cut it is several weeks before it reaches its fully contracted position. If, then, a muscle group is going to pull a fragment into a certain position it will be some weeks before this position is finally reached. Before this happens, however, the fragments will have united, and their position may be a bad one.

The principle having to do with the deforming action of muscles clearly needs closer examination. Further, the student will discover that the second principle, having to do with position and an early return to function, also needs review. He will find that in certain positions unexpected difficulties arise. This is particularly true with the right-angled position of the foot and will be referred to at greater length later.

When, stimulated by these difficulties, the student makes further investigations, he discovers (probably to his astonishment, as there is no mention of it in text-books) that there is still another theory in the field. This is the theory of R. Hamilton Russell, which must now be examined in some detail.

This theory has also to do with the action of muscles, but it is almost diametrically opposed to the theory already discussed. Hamilton Russell holds that, if certain conditions are fulfilled, muscles will never cause deformity of a fractured limb. The first of these conditions, of course, is that the limb be adequately splinted and, further, that the splint should cause no discomfort. But the main condition is that the limb be placed in a position that is naturally one of rest. Hamilton Russell's theory is summed up in the following sentences:

> Muscles are the creatures of habit and the slaves of custom. In a broken limb every muscle and muscle fibre will co-operate in the endeavour to preserve the position to which it has always been habituated and the last thing a muscle will do will be to abuse its liberty by displacing a fragment into an unnatural and unaccustomed position.[2]

In my previous paper on this subject I undertook an examination of Hamilton Russell's opinions in the light of acknowledged physiological research, and compared his theories of muscular action with those of Sherrington. To my surprise and pleasure I found that the views which Hamilton Russell had arrived at by purely clinical methods and which he had stated in the early part of this century, before Sherrington's work had appeared, were very much those at which Sherrington arrived as the result of prolonged physiological research. It was to my mind an outstanding example of how a great thinker can make use of purely clinical material.

Briefly stated, Sherrington's views are these. He points out that muscle has two functions. It has to alter position and it has to maintain this altered position. His studies are mainly concerned with this latter function, the maintenance of position. Such a function can be best studied when the body and its limbs are not in movement and have assumed a natural attitude. This attitude is different from the attitude that would be dictated by gravity. When muscle is maintaining such a position it is said to be exhibiting tonus. When a muscle is exhibiting tonus it is not in active contraction; its function is to maintain and not to alter position. In these circumstances position can be maintained for long periods without fatigue. When one natural position is changed for another the muscles exhibit "shortening and lengthening reactions". (I take this to mean that if, for instance, the forearm which has been hanging by the side is brought to a position at right angles to the arm, the extensors lengthen and the flexors shorten, but without any alteration in tone in either group.) The most important part of Sherrington's work, however, refers to the system that controls muscle tone. He points out that muscles performing this particular duty of maintaining posture are part of the proprioceptive system. This is a system of automatic adjustment which has its central control station in the cerebellum. Its sources of information come from within rather than from without. That is to say, it is not affected by such impulses as heat, cold, pain *et cetera*. It is affected rather by messages coming from the labyrinth, from joints and from muscles. It is therefore the system which controls position, and particularly the positions adopted by the body and by the limb when these are not in active movement. As muscles maintain these positions, this means that when a limb falls into a position of rest, every muscle in that limb automatically assumes the "tone" that is appropriate to that position.

It can be seen how all this fits in with Hamilton Russell's theory. Reduce the fracture, apply the splint, and place the limb in a position to which it is accustomed. The instincts of each muscle then urge it to maintain this customary position. It was a stroke of genius on Hamilton Russell's part to realize what is obvious now he has pointed it out, that there are these natural positions of rest. What the anatomical school says is: "Study the origins and insertions of muscles." What Russell says is: "Study the natural positions of rest and the muscles will look after themselves."

PART II.

Hamilton Russell's theory is very attractive, but the student will find, as is the case with most principles, that there are certain qualifications. There are certain apparent discrepancies which have to be explained. These had better be dealt with at once and in some detail. The first objection that will be raised to the theory is that there are certain fractures in which deformity does occur in spite of the limb being placed in a position of rest. In fractures of the olecranon and patella, for instance, shortening is always present, and operation to hold the fragments together is necessary. To explain this discrepancy it will be necessary to go into the question of how "shortening" of a muscle occurs. It is usually assumed that an unopposed or cut muscle shortens because of its "tone". According to Sherrington, however, a muscle exhibiting tone is not in a state of contraction. The explanation of shortening is, I think, that given in my previous paper. It is this. If a muscle is cut and then actively contracts, it will not quite return to its original length after contraction unless there is present a slight force to pull it out. If this slight force is not present, it will remain slightly shortened. It will then assume this shortened length as its maximum. After further active contraction, however, it will fail to return to this length. In this way it will finally reach its fully contracted position. It will be asked what is the use of labouring this explanation when, whatever the cause, the muscles do contract. One reason is to supply an explanation which is not at variance with physiological principles, and, further than this, to point out that this is the main qualification to Hamilton Russell's theory. This is that, no matter how much a muscle may desire to assume its natural position, it cannot do so unless there is present the slight amount of force necessary to pull it out to its full length after active contraction. If this force is not present, shortening may occur and consequently deformity. This is of importance in the modern treatment of fractures, as after the fracture is set so much active movement is allowed that even the muscles within the splint must participate to some extent. It is seen then how contraction occurs after fractures of the olecranon and patella. There are no opponent groups attached to the fragments, and it is impossible without operation to apply the necessary small amount of force.

Inquiry must now be made into the other types of deformity. Can the requisite amount of force be applied in these cases? There are three kinds of deformity that can be caused by muscle action: (*a*) shortening, (*b*) angulation, (*c*) rotation. Now it is obvious that in the first two of these possibilities the necessary slight force can easily be applied. The shortening tendency can easily be countered by an extension apparatus. The tendency to angulation is prevented by the pressure of the soft parts once the limb has been splinted. The amount of force necessary in these cases is not great. The huge extension weights that are sometimes applied to fractured thighs can be necessary only for producing reduction; they are certainly not necessary to prevent shortening. Hamilton Russell used to teach that heavy weights defeated their own ends inasmuch as they were a stimulus to muscle contraction.

So much for these two types of deformity. The case of rotation deformity is very different. It is obvious that no sort of apparatus can prevent this if it is going to happen. The situation must, therefore, be carefully studied; and the situation is this: deformity will certainly occur if a muscle group is completely separated from its opponent; but will it if it is incompletely separated, that is, will the more powerful group dominate the less powerful? If Hamilton Russell is correct, the answer is: "No." "Once the limb is at rest in a natural position, all muscles will assume their accustomed tone and there will be no deformity." So far as rotation deformity is concerned, then, this will not occur so long as there is not complete separation of opposing muscle groups. It will be seen that there are few positions in which this can occur. Rotation deformity is described in three classical situations, which will be discussed separately.

Fracture of the Surgical Neck of the Humerus.

In the neck of the humerus, although the outward rotators are the stronger group, it is seen that there is still an inward rotator attached to the fragment, namely, the subscapularis. Therefore, if Hamilton Russell is correct, there will be no rotation deformity. In my previous paper I stated that if the fracture occurred in such a way that the proximal fragment was shaped like a ball, complete abduction of the proximal fragment was theoretically possible. I have yet to encounter such a fracture.

Fracture of the Radius Proximal to the Insertion of the Musculus Pronator Teres.

In fracture of the radius proximal to the insertion of the *musculus pronator teres* outward rotation is described. If, however, the anatomy be studied, it is seen that two large muscles take partial origins from this fragment, the *flexor digitorum sublimis* and the *flexor pollicis longus*, the latter also taking origin from the interosseous membrane. Once the limb has been splinted, the tone of these muscles should prevent outward rotation. Proximal to the origin of these muscles, however, there is nothing

to prevent outward rotation. I have never had such a fracture and so do not know what happens; but theoretically the unopposed action of the *musculus supinator* should be to produce outward rotation.

Fracture of the Proximal Third of the Femur.

Precisely the same conditions obtain in fractures of the lower third of the femur. A fracture here must go through the origin of the vastus muscle, and when the limb is supported this muscle will prevent the outward rotation that is classically described.

To sum up, then, it may be said that if Hamilton Russell is correct, deformity due to muscle action may be neglected in the majority of fractures. Definite exceptions are fractures of the olecranon and patella. Possible exceptions are certain fractures of the surgical neck of the humerus and fractures of the most proximal part of the radius. The question is: "Is he correct?" I think that he is, and that his principle is the key to the study of the positions in which fractured limbs should be placed. Practical experience is the test, and so far I have experienced nothing that has shaken my belief in his theory.

PART III.

I should like now to discuss the positions adopted for the main fractures in the light of Hamilton Russell's principles. In each case we are trying to find a position that is naturally one of rest. At the same time the position must lend itself to easy handling of the fracture. If possible, too, the position must prevent adhesions and allow an early return to function. Hamilton Russell selected two of the many natural positions of rest, one for the upper and one for the lower limb, which he considered best for all fractures. They are as follows. For the upper limb the arm hangs by the side, the forearm is at right angles across the body and in "midway" position, the wrist is neither flexed nor extended. For the lower limb the knee is slightly flexed, the whole leg is rotated slightly out and the foot is dropped about 10° to 20° below the right angle. He never pretended, of course, that this latter position was suitable for fractures of the neck of the femur. These are good positions, but we shall see that in certain cases there are other positions of rest that are even better for certain fractures.

Fractures of the Surgical Neck of the Humerus.

As far as aberrant muscle action in fracture of the surgical neck of the humerus is concerned, there is no need to abduct the arm. The fragments will always lie quietly in the arm-by-the-side position. On the other hand, the abducted position has other good features. It prevents adhesions beneath the joint and is a good position for return to function. In my previous paper I denounced this position because it could not be maintained for more than a few minutes without fatigue, and I therefore assumed that it was not a natural position of rest. I am quite certain that I was wrong. Everything is altered if the limb is supported. The position is then quite a natural one. It is the position of a man sitting in an armchair with his arm resting on the arm of the chair. The forearm is, of course, flexed and pronated, although the mid-position is also natural. This is the position that the "aeroplane" splint imposes, and it is a good one.

There are some surgeons who believe that the proximal fragment is completely rotated outwards and that therefore the whole arm must be rotated out. This seems at first an outlandish position, but when the limb is supported it is also a position of rest. It is the position adopted by a man resting his elbow on a mantelpiece and his head on his hand.

Fractures of the Shaft of the Humerus.

Böhler treats fractures of the shaft of the humerus, and indeed all fractures of the humerus, in the aeroplane splint. The advantages of this splint are that extension can easily be applied if necessary and that the forearm can be actively moved. On the other hand, the arm-by-the-side position requires no splint except a protective plaster mould, and gravity is of great help in keeping alignment. The forearm can also be actively exercised. I prefer the latter position because it is so easy to use.

Supracondylar Fractures of the Humerus.

As the position of the forearm has to be clearly stated in discussing supracondylar fracture of the humerus, it will be necessary now to discuss its natural positions of rest. The forearm, of course, has two types of movement—flexion and extension movement and rotatory movement. The flexion and extension movement will be studied first. The first thing to notice is that the position of full extension is never a position of rest. There is always a slight degree of flexion. This is in marked contrast to the leg, where full extension is the natural position when the person is standing. The next important point is that, in sharp distinction to the upper arm, the forearm can be maintained for long periods in a flexed position without fatigue. An example of this is a man holding a manuscript whilst reading to an audience. The reason for this singular power of the forearm is probably that pointed out by Professor W. A. Osborne, that it is the position in which an infant is held in the arms.

As far as fractures go, any position from slight to almost full flexion can be regarded as a position of rest.

The rotatory movement will now be studied. When at rest, the forearm is always more or less pronated. For fracture purposes it may be said that any position from the "midway position" to full pronation may be used. The important thing to note is that the supinated position is in no circumstances a position of rest.

We may now return to the supracondylar fractures of the humerus. The fully flexed position is

still in use in some schools, and it is a natural position if not forced too far. Interference with circulation is the objection to it when the elbow is very swollen, and for this reason it should be used only by experienced surgeons. The right-angled position is the most generally useful, and I would use this in all difficult fractures. There is one objection to it, however, and that is that the movement of extension is sometimes very difficult to get when the plaster is removed. Now the flexion movement of the forearm is a more powerful movement than extension, and for this reason, when good reduction of this fracture can be obtained, it is, I think, better to place the limb in its natural hanging position. This should be done, of course, only with X ray observation of the fragments.

Fractures of the Forearm.

The natural positions of rest for the forearm have been discussed in the previous section. Of these positions, the "midway" position may be selected as suitable for all fractures of the shafts, including the shafts of both bones. The fracture of the radius proximal to the insertion of the *pronator teres* has already been discussed. This fracture is classically treated with the forearm in full supination, which is not a natural position of rest. The objection to this position from the Hamilton Russell point of view is that the proximal fragment may rotate back to its natural position, leaving the lower fragment rotated out. This undoubtedly happens in the leg. If it does not happen in the forearm it is probably due to the fact that the supinator muscle is short and thick and that, as it embraces both fragments, it will, for mechanical reasons, take one fragment when the other goes.

Fractures Near the Wrist Joint.

The natural positions of rest for the wrist must be studied. It must be pointed out at once that the position of hyperextension is not natural and should not be used if aberrant muscle action is to be avoided. The natural positions vary from the position where there is neither flexion nor extension to one of full flexion (with the forearm pronated). For fracture work the two best positions to adopt are, first, the "midway" position, which is easily the best gripping position, and, secondly, for certain Colles fractures, the position of slight flexion with slight ulnar deviation. In both cases the forearm is pronated, and in both cases the position is suitable for the practice of Böhler's excellent technique.

The position of full flexion is an interesting one. It is often recommended for Colles fractures. It seems at first sight to be a forced position, but this is not so. It is the position adopted by a man who sits with his arm on the arm of a chair and lets his hand hang over the edge of the arm of the chair. It must be pointed out, however, that experience shows that if this position is adopted for more than a few days, the movement of extension is difficult to regain.

Fractures of the Thigh.

Certain schools treat fractures of the proximal third of the femur in wide abduction and of the distal third in marked flexion. It is very doubtful whether the position of wide abduction is one of rest. In any case there is no need to use it. If extension is applied to both legs, these fractures do well in the ordinary position already described. In these circumstances it seems foolish to adopt a less comfortable position which requires special apparatus.

The position of marked flexion of the knee is a natural one, as may be seen by studying the attitude of sunbathers on the beach. This again, however, is a difficult position to maintain, and is unnecessary. The difficulty encountered in both these fractures is not due to the continuance of muscle action, and measures adopted with the sole object of combating muscle action do not meet the situations.

A point that arises in connexion with fractures both above and below the knee must be considered here, and that is the fully extended position of the knee. The position is not so clear cut as in fractures of the arm, where the fully extended position is never a natural one. In the standing position the knee is, of course, extended so long as it bears weight. Once the weight is off it, however, it flexes. In the lying position most people tend to flex the knee. The fully extended position, however, can be maintained for long periods without fatigue so long as the leg is supported. In fracture work, then, it is best to use the flexed attitude, but the extended position is not so great a crime against Hamilton Russell's principles as would be the extended position of the arm.

Fractures of Both Bones Below the Knee.

Fractures of both bones below the knee are most important fractures from the point of view of those who apply Hamilton Russell's principles, as they give the outstanding examples of the difficulties that arise if these principles are neglected. There are two points to be noted. First, in the majority of people the whole leg is slightly rotated out when at rest. Secondly, the position of the foot differs in different positions of the body. This important latter point will be postponed for the moment. In regard to the first point, difficulty still arises in the use of the ordinary wooden back splint. If the leg is put so that it corresponds to the vertical footpiece, it is in an unnatural position, and I have repeatedly seen the upper fragment rotate out beneath the bandages to its natural position, leaving the lower fragment rotated inwards—a very bad position. If the back splint has to be used, the foot should be slung in sticking plaster (as is often done to prevent heel sores) and allowed to assume its natural outward rotation.

Now for the position of the foot. This must be studied in some detail, as its importance is supreme. When the foot is bearing weight, as in the standing position, it is at right angles to the leg. Even in the sitting position the right-angled position is natural

so long as the foot is firmly planted on the floor. The moment the weight is taken from the foot it drops. Thus, if a person crosses his knees, one foot may be in the natural right-angled position and the other in the natural dropped position. In the lying-down position the natural position of the foot is in no circumstances whatsoever other than dropped. There is thus a marked difference from what obtains in the upper arm, where an unnatural position becomes a natural one of rest when the limb is supported. When the patient is lying down, no amount of support will make the right-angled position a natural one. It takes, as a matter of fact, a very considerable amount of force to dorsiflex the foot to right angles if the patient is lying. It is, moreover, very difficult to keep it there. In an ordinary back splint the foot will invariably push out to its natural dropped position. Either heavy plaster must be used or else a pin must be put through the *os calcis* and extension used. In spite of this difficulty there is a strong school of thought which maintains that the foot should always be kept at right angles in fractures of the lower leg and ankle joint. This is shown by the following incident.

On December 2, 1933, Mr. Simpson Smith published in *The British Medical Journal* a method of dealing with fractures of the tibia and fibula. One of the illustrations showed such a fracture put up with the foot well below the right angle. On December 23, Mr. G. O. Tippett wrote in the journal pointing this out and saying: "This is surely a sin against the best orthopædic principles, of which I know Mr. Simpson Smith is usually a follower." In a succeeding journal Mr. Watson Jones also wrote taking Mr. Simpson Smith to task. Some of the reasons for adopting the right-angled position have already been pointed out. The act of walking is more readily regained from the right angled position. If ankylosis follows an ankle joint fracture, it is a tragedy if the foot is in a dropped position. Apart from ankle joint injuries there is the fear of foot-drop by reason of changes in the leg muscles. These are good reasons, but "good reasons must, of force, give way to better".

The followers of Hamilton Russell maintain that those who make a cast-iron rule about the right-angled position have failed to study all the considerations involved. There are very cogent reasons in a certain class of fractures why the right-angled position should never be used. Suppose an oblique fracture of the tibia and fibula; setting must be carried out with the weight of the body off the foot and therefore the natural position of the foot is dropped. When the foot is dropped the *tendo Achillis* is shortened. The surgeon now flexes the foot to right angles and what happens is this. The *tendo Achillis* has received no information that it is to lengthen and remains at the same length. The foot then acts as a lever with its fulcrum at the attachment of the *tendo Achillis*, and it must force the distal fragment up past the proximal, so that a shortened position results. To overcome the shortening the surgeon must now apply extension. Extension is particularly difficult to get in this position and it may involve skeletal traction. The point is that extension is not really necessary, as shortening is not seen if the foot is allowed to drop, and that therefore the price to be paid for the right-angled position is a very heavy one. Those who are accustomed to the dropped position say that the price is too heavy, as the fear of a permanent foot-drop is negligible. The following precautions will always prevent foot-drop. In fractures of the tibia and fibula, if a plaster mould embracing the anterior two-thirds of the limb is used, the foot-piece may be loosened at regular intervals and the foot actively dorsiflexed. This is very different, of course, from passive dorsiflexion, as the plantar flexors are now automatically lengthened. If it is not thought desirable to move the joint, the toes must be left free and the patient made to flex constantly and to extend them. Again, the amount of drop allowed should not be extreme. The natural amount of drop is not as far as the foot can be actively plantar flexed; about 10° to 20° below the right angle is sufficient. If these rules are observed, foot-drop will never be seen. A very striking example of how unnatural is the right-angled position is afforded by the warning that, if plaster is used to maintain it, it must go up to the end of the toes or else the toes will assume a clawed position. The reason for this clawed position is, of course, that the plantar flexors are trying to assume their natural position.

To sum up, one would say that in fractures of the shafts the right-angled position should be used only if the fracture is of such a nature, for example, a transverse fracture, that shortening cannot possibly occur. In all other fractures the position is dangerous and should be used only after all considerations have been taken into account.

Fractures Involving the Ankle Joint.

The same considerations may be applied in fractures involving the ankle joint. If the surgeon feels that he is placing force on the fragments by using the right-angled position, he should allow the foot to drop. Obviously, in most fractures involving the ankle joint there will be no danger of forcing a misplacement, and the right-angled position may be used with impunity. If the surgeon's experience suggests the possibility of ankylosis, the right-angled position should, of course, always be used.

This, then, is a brief glance at how Hamilton Russell's principles work when put into practice. If the surgeon follows them, he has the satisfaction of knowing that the muscles are helping and not hindering him.

Before concluding, there is one more important point to be made, and it is that everything that has been stated in regard to the position of the limb after reduction applies with equal force to the position during reduction.

Summary.

1. A brief survey is made of the principles put forward to guide surgeons as to the positions to be adopted for fractured limbs. Special attention is drawn to the principle of Hamilton Russell.

2. The cause of muscle shortening is touched upon, and as a result qualifications to Hamilton Russell's theory are defined. The possibility of muscles causing deformity in various situations is discussed.

3. Suggestions are made as to the best positions to use in classical fractures. Special attention is drawn to the danger of the "right-angled position" of the foot in fractures of the tibia and fibula.

References.

(1) C. Craig: "A Series of Fractures of the Long Bones Treated by the Methods of R. Hamilton Russell", The Medical Journal of Australia, December 29, 1928, page 808.
(2) Böhler: "The Treatment of Fractures", 1935, page 4.
(3) R. Hamilton Russell: "Papers and Addresses in Surgery", page 282.

Reports of Cases.

RESTORATION OF SCALP.

By Richard Flynn,
Sydney.

M.K., a female child, aged eleven years, was admitted to hospital on January 27, 1936, because about one hour previously she had had her hair caught in the propeller shaft of a launch and her scalp had been torn off her head.

At the time of the accident there had been a moderate amount of bleeding; but at the time of admission to hospital this had ceased. When I first saw the patient she was not suffering from shock. On examination there was an area on the vertex of the skull measuring about 12·5 by 20·0 centimetres (five by eight inches) from which the scalp was entirely missing, and the portion of scalp remaining had retracted towards the eyebrows in front and the external occipital protuberance and nuchal lines posteriorly.

She was taken to the operating theatre at once, and under anæsthesia the remaining hair, which was thickly infested with *Pediculus capitis*, was shaved off and and the raw area was douched with hydrogen peroxide and "Acriflavine", and the whole of the head was painted with weak tincture of iodine. Irregular edges of the scalp were sutured in front so that there was no alteration in the appearance of the forehead, and then a series of long silkworm gut sutures were inserted transversely and antero-posteriorly in order to draw the remaining parts of the scalp into position; this manœuvre reduced the exposed area of skull by about one half. A dressing of vaseline gauze was applied. The patient was returned to bed in good condition with no evidence of shock.

On February 20, 1936, an incision was made on both sides through the entire thickness of the scalp about 3·75 centimetres (one and a half inches) from the lateral borders of the wound, and the two strips of scalp were shifted medially over the granulating areas. A piece of tape was inserted under both strips of scalp and tied so as to maintain them in their new position. Long silkworm gut sutures were inserted into the new peripheral portion of the wound over the strips to prevent any broadening of the wound. There was not very much blood loss; but the child was considerably shocked. A blood transfusion was given later in the evening of that day. The scalp was dressed with boracic gauze.

Figure I.

Photograph taken about three weeks after admission. It shows the extent of the wound, 15·0 by 10·0 centimetres (six by four inches), which remained to be treated by grafting, and an area 1·9 by 1·25 centimetres (three-quarters by half an inch) on the right, where there were no granulations and bare bone was exposed.

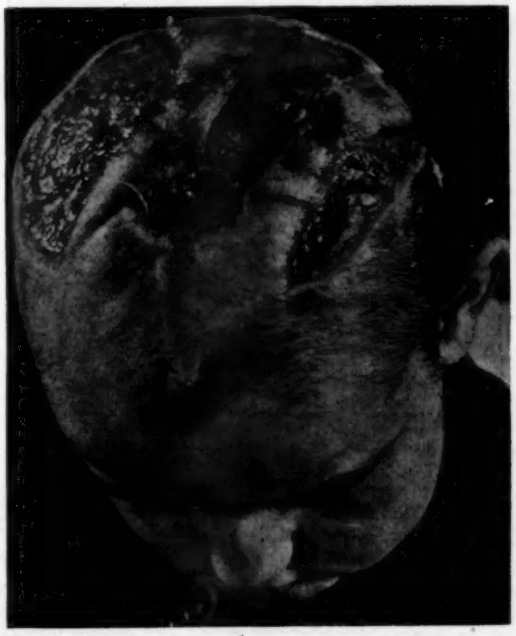


Figure II.

Photograph showing the appearance after the operation performed on February 20, 1936.

FIGURE III.
Photograph of the patient in December, 1936.

FIGURE IV.
Same as Figure III.

On March 5, 1936, two further strips of scalp were raised from the lateral border of the wound and shifted medially, and the bare areas were packed with vaseline gauze. An attempt to cover some of the raw area with a full-thickness graft on April 10, 1936, failed, only a small portion of the graft living. X ray examination of the skull on April 30, 1936, was reported on by the radiographer as follows: "There is an area of rarefaction surrounding some bony sclerosis in the right parietal region near the vortex, most probably due to some infection."

On May 20, 1936, a small sequestrum about 3·75 centimetres (one and a half inches) in diameter, which consisted of the outer table of bone only, was removed. From this time the wound healed rapidly.

The method of treatment adopted in this case was based on a suggestion of G. F. Mitchell published in *The British Medical Journal*, January 7, 1933.

Reviews.

AN INTRODUCTION TO ORTHOPÆDIC SURGERY.

IN "Elements of Orthopædic Surgery", Dr. Ross Smith has attempted to give a "practical account of the elements of orthopædic surgery for practitioners and students who do not require the full knowledge given by larger text-books, and for nurses and masseuses engaged in orthopædic work".[1] The task undertaken was a difficult one, and it is not surprising that the book is disappointing. Altogether too much space is taken up with treatment and insufficient attention paid to diagnosis; for the student and general practitioner require education in diagnosis, especially early diagnosis. Treatment often rightly belongs to the orthopædic surgeon.

In the chapter on tuberculosis of bones and joints the placing of "pain" and "constant aching" as early symptoms will not be helpful to the general practitioner, and a similar criticism could be levelled at the description of other conditions. The book is interestingly written, easy to read and well illustrated, but it is not likely to be very helpful to general practitioners.

DISEASES OF THE RECTUM AND ANUS.

THE "Synopsis of Ano-Rectal Diseases", by Louis J. Hirschman, contains a wealth of detail and many helpful hints concerning the common rectal ailments, but proves disappointing when compared with other books on rectal surgery.[2]

In the preface the author explains the absence of pathological and bacteriological details. The more extensive use of local anæsthesia in operative procedures in rectal conditions is urged and the technique is fully described.

For practically every ano-rectal operation and in the routine examination of a patient the left lateral position is advised. This is not the common practice in this country. A quinine and urea solution is advocated for the injection treatment of hæmorrhoids after a preliminary soda enema.

An illuminating chapter on constipation and obstipation includes a description of a rubber dilating rectal massage bag. Reference to carcinoma of the rectum is very scanty, while anal epithelioma is neglected altogether.

The author evidently does not practise the wide skin excisions advocated by Gabriel as necessary for drainage in cases of fissure or fistula. The well-known "A.B.A." solution is not mentioned, while the author's modification of Ball's operation is fully described.

Although little new knowledge is to be gained by its perusal, this book is nevertheless excellently arranged and well illustrated.

[1] "Elements of Orthopædic Surgery", by N. R. Smith, M.B., Ch.M., F.R.C.S., with a forword by R. C. Elmslie, O.B.E., M.S., F.R.C.S.; 1937. Bristol: John Wright and Sons Limited. Crown 8vo, pp 257, with illustrations. Price: 10s. 6d. net.

[2] "Synopsis of Ano-Rectal Diseases", by L. J. Hirschman, M.D., F.A.C.S.; 1937. St. Louis: The C. V. Mosby Company. Large crown 8vo, pp. 288, with 174 text illustrations and 6 colour plates. Price: $3.50 net.

The Medical Journal of Australia

SATURDAY, SEPTEMBER 25, 1937.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.

THE FUTURE OF THE PROFESSIONS.

THE liberal facilities for education granted by every Australian State to its children make easy the path by which every youth of ability may enter one of the learned professions. In the last two decades the influx of entrants to the faculties of law and medicine, particularly the latter, in our universities has increased from a modest stream to what threatens shortly to become a veritable avalanche. Whether our scanty population will be able to absorb and to provide adequately for these doctors and lawyers of the future is food for speculation. We trust that from the jostle for practices and positions all of them will escape with a prize. That is our trust and our hope, not merely for the sake of the men themselves, but even more for the honour and integrity of their high callings. Overcrowding is a peril for any profession. Inherent moral weaknesses in men are extracted and displayed to view when competition is too keen and poverty pinches. It is then that the unworthy deviate from the road of rectitude and by their conduct depreciate public respect for the professions. The glutting of the professions is, however, an acute rather than a chronic problem. The difficulty will be solved by the growing unpopularity of callings which offer limited opportunities for advancement; other vocations will beckon the student descending the threshold of his school. Thus do time and circumstance bring about an automatic solution, though many suffer in the adjustment.

A more vital question than overcrowding is the future of the professions. It is good to pause a while on our journey, to reflect on the progress we have made, and to survey the prospect of our future. We are moving; but are we really advancing? What is our goal and is it worthy of our best endeavour? At first glance it would seem that medicine at least is a profession which, in knowledge and efficiency, is growing apace. Our students receive a more intensive training in the fundamental sciences than ever before, an increasing standard of knowledge in the applied sciences is required of them, and after graduation many of them travel abroad and return with honours thick upon them. Our country towns in these latter days boast of young practitioners of medicine who rival their urban brethren in academic achievement, in knowledge of the intricate problems of modern medicine and in professional skill. The consultants in medicine and surgery and in the specialties are multiplying in suburban and rural districts, thus palpably lessening the migration of patients to the big city centres. All this is evidence of luxuriant growth, the immediate value of which can hardly be gainsaid. Doubtless, a similar development is visible in other professions. Even law, with its limping foot, is striding apace, and specialism now claims a place in that calling which it never knew before.

We might well ask whether in this fervid race for efficiency we are gaining everything and losing nothing. Much, indeed, we have gained. But something we have also lost. In a way we are fast becoming mechanized. The value of a doctor to the community cannot always be measured in terms of scientific knowledge and technical skill. Certain qualities that make the full man are less defined but of no less worth to his fellows than those which are expressed in academic honours or diplomas. These qualities include moral strength,

breadth of vision and leadership. Without them knowledge is jejune, with them it becomes wisdom. Our professional men should beware lest in the mad rush for preferment they immolate these indefinable virtues on the altar of technical achievement and become mere robots of the higher order.

An attempt at remedy has already been made in certain universities abroad. Candidates for entrance to the faculty of medicine are subjected to a strict scrutiny, and only those who attain to certain vague standards of moral, mental and physical efficiency are permitted to enter upon a medical career. The rejects are thus compelled to embrace some other calling. Whether this method of restraining unwholesome competition and of selecting students of proper calibre would be welcomed in Australia is doubtful. Our democratic sentiment, our love of equality of opportunity, might reluct at this dictatorial scheme. It is open to the grave objection that first impressions of a boy's potential character and ability are subject to error.

There is a better, juster and more certain cure if we only care to use it. It is to give our boys and girls who aspire to a medical career a broader culture and pre-professional education. Subjects of immediate utility should be taught at a much later stage in the school curriculum, when the student's mind has been broadened by a more intensive study of his nation's literature, of foreign tongues, of mathematics, and of the history of culture. At present, boys are urged at too early a stage to learn chemistry and physics, not because these subjects constitute an introduction to the scientific method, but because their study anticipates the competitive struggle in the first year of the medical course. It is not realized that the mental development promoted by more liberal courses of study during the school years will allow a student to become rapidly proficient in scientific subjects in the later years. With his better cultural outlook and richer mind he will soon outstrip competitors who have had a narrow mental training. The fact is that our boys enter the university at too tender an age and with too boyish a mind. Their school education is worthy of a mechanic, but not of a professional man. Once they enter a professional faculty they have no leisure for those pursuits of the mind which broaden the sympathies and fire the imagination, and he who is unimaginative and is insensitive to the drama of life is but a poor creature, be he ever so learned in medicine or science.

Unless some effort is made to enlarge the vision of our medical neophytes and to impress on them the stamp of a broader culture, the status of the profession of medicine will be jeopardized. Those who love the calling of Hippocrates and the tradition of scholarship of which its history boasts, revolt at the prospect of its degradation. This is a real danger. The future may see highly trained technicians in medicine and surgery, walking encyclopædias of a narrow knowledge, who will be subject to the gross limitations of every unilateral mind. Should this come to pass, the reverence for medicine as a profession will have vanished. The mechanization will be complete.

Current Comment.

SATISFACTORY SHAVING.

Two American investigators, Lester Hollander and Elbridge J. Casselman, have recently published the results of an unusual and interesting piece of research.[1] During the past four years they have determined what factors are necessary to make the operation of shaving comfortable and satisfactory. In 1931 a shaving clinic was established at the Mellon Institute, University of Pittsburgh. Here, thirty-one men, with hair of various colours and degrees of coarseness, submitted to the ministrations of fifteen barbers, and the relative importance which razor design, preparation of the face and composition of soap play in the technique of removing hair from the face was carefully studied.

Hollander and Casselman have shown that hair may be softened by aqueous solutions. If a dry hair is stressed by a weight representing sixteen kilograms per square metre of load, that hair does not stretch, but if the hair is fully saturated with water a stretching effect is produced up to 50% of the original length. The effective shaving angle at which the razor is held is also of prime importance; this angle is that which is formed between the central plane of the blade near its edge and a plane passing through its edge tangentially to the guard. A correction in angle of two to three degrees is commonly necessary if this guard is toothed and not composed of a solid bar.

[1] *The Journal of the American Medical Association*, July 10, 1937.

The normal influences which affect the problem of shaving are exposure to wind and weather, solar radiation and the results of shaving itself, such as the preparation of the face, the trauma due to use of the razor, and the nature of the attention given to the face at the end of the operation. The excretory activities of the sweat and sebaceous glands have also to be considered.

Facial hair is of two types, the fine lanugo and the coarser, thicker growth. Only the latter enters into the matter of shaving. Its distribution on the face is subject to individual variation, and the greatest difficulty in removing it is usually encountered on the upper lip and the central part of the chin. Hair grows at its fastest rate immediately shaving is over; later, the speed of growth slows down until the normal average of eleven to twelve millimetres a month is reached. The growth is never perpendicular to the face, except on the anterior portion of the chin. In the cervical angle the hair lies nearly flat; elsewhere it has an inclination to the plane of the skin of from 31° to 59°. Chemically hair is composed mainly of keratin, a complex compound of nitrogen and sulphur, the latter in the form of cystine. Keratin is insoluble in water, but it absorbs water readily, so that, as already seen, the tensile strength and consequently the hardness of the hair shaft are lessened by water absorption. The taking up of water is greatly hindered by the presence on the hair of sebaceous secretion. The purpose of facial preparation before shaving, then, is to remove this sebaceous secretion and to soften the hard hair shaft. Its secondary aims are the provision of a lubricated surface for the passage of the razor blade, and of a stiff supporting medium (the lather) for the base of the hair.

Bearing in mind these facts, it is now certain that when a man complains that a shave has been unsatisfactory, either a dull blade has been used, an improper shaving angle has been employed, or the hair has been insufficiently softened. By means of the tests outlined above, whereby the stretching of hair under loads in liquids was determined, the obvious advantages of warm water over cold were very apparent, as was the value of soapy solutions over plain water. Facial hair was found to soften materially under conditions which produced 0·85 of its full stretch under load. Dark hair was found to be affected in this manner much more quickly than was hair of a white or grey colour. With water at a temperature of 120° F. the maximum amount of softening was apparent at the end of three minutes. This time is greatly exceeded when cold water is used.

In connexion with complaints of discomfort during shaving, the observers noted that when "dry shaves", without any preliminary wetting of the face, were given, the average razor blade would not last for the duration of the operation. With an adequate preparation of the beard, a blade will still be useful after four or five shaves.

The best shaving soaps or creams are those which produce a copious lather, dry slowly upon the skin, and produce no irritation.

Although more than sixty years have now passed since the first safety device was fitted to a razor, the usual type of safety razor did not come into general use until the twentieth century. A well-known encyclopædia, in an article on the subject, remarks that the blades of most safety razors are not meant to last, and that for this reason many men still prefer the old-fashioned instrument. Hollander and Casselman state, however, that practically all razor blades now made contain steel as good or better in quality than the finest steel ever used in the old-style razor. This point is worthy of notice, as it has a bearing on the durability of surgical scalpels. These authors further state that corrosion of the edge of the blade is a very small factor in the production of bluntness. The point of greatest importance is that all serrations should as far as possible be removed by adequate stropping.

The data now available after scientific inquiry into the subject of shaving afford valuable hints as to the best technique to employ. The face should first be washed with hot water and a non-irritating soap for half a minute or more and then rinsed. Layers of sweat and sebum, as well as grit and other extraneous materials, are thus removed. The next step is to apply the shaving soap, rubbing it well into the face with the palm of the hand and using water copiously. This process should be continued for three minutes. During the actual shaving both the razor and the face should remain thoroughly wet, and the lather maintained on the skin. Persons with hypersensitive skins are advised to use cold water during the final lathering and to employ a shaving soap with which menthol has been incorporated.

Shaving, or pogonotomy, is a very ancient art, the reason being that most men dislike exuberant growths of hair upon their faces. Excavators in Egypt and Babylonia have described as razors certain objects which they have dug up, though a modern barber and his client would hesitate before accepting the definition. In the Bible are to be found several regulations regarding shaving, the best known being that in Ezekiel: "And thou, son of man, take thee a sharp knife, take thee a barber's razor, and cause it to pass upon thine head and upon thy beard." Before the year 400 B.C. a guild of barbers flourished in Athens, and the young bloods of Rome seemed to have copied the habit of the daily shave from that gallant and popular patrician, the younger Scipio. For centuries the human male has been removing hair from his face with pieces of pumice, or weapons of flint, bronze, iron and steel. The literature of the subject is voluminous, and comes from all sources, professional and lay; but up to the present little reliable information of a technical nature has been available. The contribution of Hollander and Casselman, being the fruit of prolonged scientific investigation, is therefore of great value.

Abstracts from Current Medical Literature.

DERMATOLOGY.

Psoriasis.

C. G. LANE AND G. M. CRAWFORD (*Archives of Dermatology and Syphilology*, June, 1937) have made a statistical study of 231 cases of psoriasis. The incidence among patients attending a general clinic was about 0·5% and approximately 6% of the total who suffered from dermatological conditions. The average age at onset was twenty years. Remissions with all types of treatment occurred in only 16·5% of cases. The areas most frequently involved were in the following order: the arms, the scalp, the legs, the trunk, the finger nails and the face. Pruritus was present in about 33% of the patients. There were approximately five times as many patients who were overweight as there were below the average weight for their age and height. Slightly more than 60% of patients manifested an improvement in the summer, whereas a little over 14% were adversely affected by warm weather and exposure to the sun's rays. A familial incidence was present in roughly 26% of the cases. The five most successful methods of therapy were all external measures: administration of sulphur, of tar derivatives, of chrysarobin, and of ammoniated mercury, and exposure to the sun's rays and ultra-violet radiation. In approximately 72% of 204 pregnancies there was no effect on the psoriasis. There were 44 patients who were known to have taken in the past a solution of potassium arsenite. Of these, almost 40% had had either immediate reactions of intolerance or were found to exhibit late unfortunate sequelæ of the use of arsenic. The authors express the opinion that this is a rather high incidence of untoward effects, in view of the amount of benefit to be derived from the use of arsenic.

Acute Dermatomyositis.

E. PEARL GRETTON-WATSON (*The British Journal of Dermatology and Syphilis*, June, 1937) reports a case of acute dermatomyositis. The patient was a boy, aged eighteen years, who was sent to hospital with a diagnosis of acute rheumatism. The illness began with a "cold" and an irritating cough; later, swellings occurred in the arms and lower part of the thighs. The swellings, which were symmetrical, were painful and hard, and movements at the elbows and knees, particularly the elbows, were limited, partly by the swelling and partly by the pain. After a day or two the swellings turned red. The patient worked in a factory, where he did some form of electric welding, during the course of which he received numerous small burns and abrasions on his hands. When the patient was admitted to hospital the arms were swollen, hot and bright red; the swelling began in the middle of the arm and extended half way down the forearm. The skin was indurated, very firm, pitted very slightly on pressure, and was slightly tender to touch. The lesions closely resembled two enormous patches of *erythema nodosum*. In the thighs the condition was somewhat similar, involving the lower third and extending to the upper border of the patella. During the second week the patient's temperature became high, he sweated and had nocturnal delirium. As the inflammation subsided, thickening of the skin diminished, and hard masses, obviously muscle, could be detected beneath it. Biopsy revealed a subacute inflammatory process in the muscle with in some parts complete necrosis and destruction of the muscle fibres. In the remaining parts there was an infiltration between the muscle fibres, especially with eosinophile cells and with mononuclear cells having vesicular nuclei. In some areas remains of muscle fibres could be detected and there were large numbers of giant cells with many peripherally-arranged nuclei. The author reproduces photomicrographs of biopsy sections, and he points out that the case was typical, though he adds that non-involvement of the face was unusual. He finds it difficult to explain the significance of the abundance of eosinophile cells. He also refers to the suggestion that the finding of giant cells suggests active regeneration of muscle cells.

Herpes Zoster.

EDWARD S. STERN (*The British Journal of Dermatology and Syphilis*, June, 1937) reports cases and discusses the mechanism of *herpes zoster*. He refers to the theory of Head and Campbell, that the eruption in this condition is caused by impulses passing from the lesion in the posterior root ganglion down the sensory nerves to the skin. Lewis and Marvin also thought that the eruption was due to antidromic impulses. The eruption has, on the other hand, been thought to be due to the passage of the causative organism itself down the nerve; Goodpasture has in this way produced a similar disease by using the virus of *herpes simplex*. The author records the history of a case of *herpes zoster* in which he blocked the nerve with a solution of a local anæsthetic and then with absolute alcohol. The result of this experiment is regarded as proving that the eruption is due to organisms passing down the nerves. In another case *post mortem* changes in the sensory ganglion and in the sensory nerve as far as the skin are regarded as dispos'ng of the ant'dromic impulse theory and as ind'cating the passage of an infect'on along the nerve trunk or its lymphatics. The relationship of *herpes zoster* to chickenpox is discussed by the author. He holds that the two conditions are caused by the same infection. In the Napsbury Mental Hospital, St. Albans, from which the author writes, five cases of chickenpox have occurred in the last six years; in none of them could a possible source be found, except that four of the patients had been in contact with *herpes zoster*.

Manganese Therapy for Psoriasis.

E. L. OLIVER AND G. M. CRAWFORD (*Archives of Dermatology and Syphilology*, June, 1937) have treated 143 patients who were suffering from psoriasis by means of colloidal manganese. Each patient received a series of twenty injections given at intervals of a week; the follow-up period extended over two years. The percentage of patients in whom the condition cleared was as high as 20 when suitable local measures were combined with the injections. The results were most satisfactory when the face was involved; pruritus was relieved in a large percentage of patients.

Cutaneous Tuberculosis.

W. H. GORDON (*Archives of Dermatology and Syphilology*, June, 1937) reports an unusual case of cutaneous tuberculosis. He refers to Darier's statement that there are only two characters of absolute scientific value permitting the assertion that a cutaneous lesion is tuberculous. They are: the presence in the lesion of the bacillus of Koch, and the positive result of inoculation of the diseased tissue into animals. He adds a third: the recovery of tubercle bacilli in culture mediums inoculated with material from the questionable lesion. This method was adopted in the case reported by the author. The lesion occurred over the sternum at the manubrial junction of a negro aged twenty-seven years. The patient sustained an injury at the site of the lesion fifteen years before his admission to hospital. Difficulty was experienced in differentiating the lesion from a syphilitic lesion because of the occurrence of a "++++" reaction to the Kahn test.

UROLOGY.

Morphogeny of Renal Calculus.

A. RANDALL AND P. D. MELVIN (*Journal of Urology*, June, 1937) are dissatisfied with the current theories regarding the origin of primary renal calculi. Stone is a symptom, not a disease entity, and must arise from an irritating lesion. After the failure of many lines of research, stones were sought "in the state of what might be called embryological development". The renal papilla was suspected as the site of origin, and 298 pairs of kidneys were searched with a hand lens, special attention being devoted

to the papillæ. Twenty-eight of these have shown a lesion previously unrecognized, consisting of a deposit of calcium in the walls of the renal papilla. In eight instances a stone was found in the act of crystallization upon such a calcium plaque and still faintly adherent to it. By differential staining of microscopic sections the plaques were proved to be of calcium. The sections show that the deposit is in the papilla, not superficial. Subsequently the surface is denuded and the plaque bathed in urine, from which crystals are deposited. The specimens from which slides were made show no evidence of infection. Certain clinical evidence, observed previously, supports these findings: first, the frequency with which the smallest radiographic shadows of renal calculi are to be found in the position of the minor calyces; secondly, the study of small renal calculi which have been passed rapidly or have been promptly removed, has demonstrated under magnification that, while the greater part of the calculus is crystalline, there is almost always one surface which is smooth, slightly depressed and distinctly different from the remainder. This suggests that this surface has been a point of mural attachment. It is suggested that the deposition of calcium in the papilla is a reparative process similar to that seen in other parts of the body. The cause of the original damage is unexplained.

Pathogenesis and Histology of Prostatic Carcinoma.

T. HRYNTSCHAK (*Urologia*, March, 1937) states that carcinoma may develop in the common adenoma of the prostate or in the compressed true prostatic tissue behind the adenoma that is in the part which forms the so-called "surgical capsule". Statistics show that carcinomatous development is about twice as common from the true prostatic tissue. The author advances a carcinomogenetic theory suggesting that the lesions which precede "pre-carcinomatous" lesions are foci of "regeneration". In a series of 310 enucleated prostatic carcinomata, careful histological study showed that such areas of "regeneration" were never lacking in cases of early carcinoma. These areas of regeneration acini occurred in response to inflammatory or other morbid stimuli, and were presented as immature or more highly developed acini, which later on showed irregular heaping up of the epithelial layers, surrounding lymphocytic infiltration, polymorphism and polychromasia of cell nuclei, and later mitotic figures and deeper nuclear staining. These areas of acinar regeneration are always found in a number of areas throughout the adenoma, and are never confined to one portion; moreover, they are usually situated peripherally. There is some reason to suspect that they may have extended into the hyperplastic portion from the true compressed prostatic tissue. The author claims that all stages have been observed, from the earliest attempts at acinar regeneration, through all gradations up to definite carcinoma without break, and that the carcinomatous changes have been shown to be multicentric in origin, corresponding to the multiplicity of areas of regeneration. In the specimens examined in this series definite carcinoma was found in 3% of the cases, while pre-carcinomatous lesions were seen in another 7%. It should be noted that such figures take no account at all of the possible existence of early lesions of carcinoma in the true prostatic tissue or surgical capsule. That such lesions occur is shown by the cases in which carcinoma developed later in what has been wrongly called the "prostatic bed".

"Avertin" in the Treatment of Ureteral Calculi.

AN observation by Waddell, that "Avertin" administered intravenously or rectally or applied locally depressed the ureteral musculature and relieved spasm, has stimulated W. D. Jarman and W. W. Scott (*Journal of Urology*, July, 1937) to apply it clinically. After routine preliminary treatment two or three ureteric catheters are passed, if possible, beyond the stone and left *in situ* for forty-eight hours. At the end of that time a 2% solution of "Avertin" in sterile distilled water is injected into the renal pelvis in sufficient quantity to cause slight pain. Fifteen minutes later the catheters are withdrawn and the patient is instructed to void urine. When instruments fail to pass the stone, "Avertin" is administered by the rectum as a basal anæsthetic. This has succeeded in three cases in causing sufficient relaxation of the ureter to permit catheters to pass. Twenty-seven patients have been so treated. The calculus was recovered from twenty-five. Of these, thirteen passed the stone on first voiding urine. In six cases two operations were necessary and in one case three. In two cases in which the stone was not passed, the authors believe that they would have been successful had they not been forced to operate by other circumstances.

Spontaneous Pyelo-Ureteral Rupture.

L. A. SURRACO (*Journal d'Urologie*, January, 1937) draws attention to an urgent abdominal syndrome simulating a peritoneal cavity disaster, but differentiated by certain characteristics; this is a spontaneous rupture at the uretero-pelvic junction or in some part of the ureter, allowing the excursion of infected urine into the tissues immediately behind the peritoneum. The underlying condition is an impacted ureteric calculus, and the necessary accompanying lesion is a state of periureteritis which causes narrowing or obstruction of the ureter and so brings about the rupture. Clinically there is a sudden onset, independent of trauma or sudden strain, with profound, violent pain, being characteristically continuous and not paroxysmal, as with renal or ureteric colic, and so leading to suspicion of an intraperitoneal lesion. Prolonged and violent muscle contraction is at first confined to the affected site and later spreads to the other, causing confusion with intraperitoneal lesions. The picture of spontaneous rupture of the ureter is characterized by an infective or toxic syndrome, and lacks the anæmic syndrome accompanying hæmorrhage, such as may occur with traumatic renal rupture. Pyelography is of inestimable value in diagnosis.

Diencephalon and Bladder Tonus.

JOHN BEATTIE AND ALAN S. KERR (*Brain*, Volume LIX, Part 3, 1936) describe the effects of diencephalic stimulation on urinary bladder tonus. Evidence of the existence of centres for the increase of tonus in the anterior hypothalamus and for inhibition of tonus in the posterior hypothalamus and upper mid-brain is adduced. They explain the response obtained by stimulation of the latter as being due to activation of effector pathways. Bladder inhibition, due to hypothalamic stimulation, they found to be due to activation of a direct nervous pathway to that organ, and also to stimulation of adrenalosecretory fibres.

Decapsulation in Nephritic Lesions.

A. PATANIA (*Urologia*, March, 1937) reports on studies made in guinea-pigs poisoned with uranium nitrate or corrosive sublimate, with later renal decapsulation performed for the purpose of ameliorating renal lesions caused by such intoxication. Such cases presented oliguria or anuria, and a diuretic effect was expected from the operations. The author comes to the conclusion that reasonable efficacy can be expected only in those cases in which the parenchymal lesions have not extended to the glomeruli, and, moreover, in which the tubular lesions are only slight and not widely spread throughout the organ.

Bilateral Hydronephrosis.

H. SMAGGE (*Journal d'Urologie*, January, 1937) discusses the pathogenesis and management of bilateral hydronephrosis, pointing out that such conditions are frequently congenital, with primary dilatation of the upper urinary tract, often on both sides, and not dependent on any form of distal obstruction. In any case of hydronephrosis, presumably unilateral, complete bilateral retrograde pyelographic study should be made in order to exclude bilaterality in case nephrectomy is imposed on the surgeon at operation. In large infected bilateral hydronephrosis temporary drainage of one kidney through the loin is suitable, especially if the opposite kidney is damaged beyond repair.

British Medical Association News.

NOMINATIONS AND ELECTIONS.

THE undermentioned have been elected members of the New South Wales Branch of the British Medical Association:

Hodge, Arthur Harold, M.B., 1935 (Univ. Sydney), 12, Butler's Road, Hurstville.

Lilier, Francis, M.B., 1937 (Univ. Sydney), Ocean Street, Dudley.

Varvaressos, Demetrios, L.R.C.P., L.R.C.S., 1937 (Edinburgh), L.R.F.P.S., 1937 (Glasgow), 61, Latimer Road, Bellevue Hill.

The undermentioned has been elected a member of the South Australian Branch of the British Medical Association:

Mackay, Eleanor Margaret, M.B., B.S., 1936 (Univ. Melbourne), Adelaide Hospital, Adelaide.

Medical Societies.

THE MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Pædiatric Society was held on May 31, 1937, at the Children's Hospital, Carlton, Melbourne, DR. ROBERT SOUTHBY, the President, in the chair. The meeting took the form of a series of clinical demonstrations, followed by discussions, by members of the society.

Two Cases for Diagnosis.

DR. R. L. FORSYTH showed two patients who had recently had illnesses with cerebral signs and symptoms, and both patients had presented unusual cerebro-spinal fluid findings. One patient was a boy, G.M., eight years of age. Three days after operation on the tonsils he had had a pain in the back, would not sit up, was unable to stand, and had some difficulty with micturition. By the eighth day definite signs of meningeal irritation developed with some doubtful weaknesses of muscles in the arm and hip, but certainly with some tenderness in the back and weakness in the abdominal muscles. At that stage the temperature was rising daily to 37·8° or 38·3° C. (100 or 101° F.) and the cerebro-spinal fluid contained 110 cells per cubic millimetre. By the eleventh day the fluid contained only 40 cells per cubic millimetre, but the patient had incontinence of urine and fæces. His condition improved rapidly and by the thirteenth day was almost afebrile, but at that time he complained of severe headache and the cell count of the cerebro-spinal fluid was found to be over 4,500 cells. After four days the headache was relieved and the cell count had fallen to 180 cells; by the forty-fourth day the cells had been reduced to 28 cells per cubic millimetre. As a result of an attempt to make the child get out of bed on the forty-seventh day, the temperature rose to 38·0° C. (100·4° F.) and the headache returned. Dr. Forsyth reported that the boy had made an apparently complete recovery, though he still had a little tenderness over the lower thoracic and upper lumbar spines; every sign had disappeared and he was very well. He was afebrile, and examination of the fundi and cerebro-spinal fluid, including attempted cultures, and radiographic investigation of the chest and vertebral column failed to reveal any abnormality; the blood serum did not react to the Wassermann test and in every other way no further evidence had been obtained which would affect the diagnosis or the prognosis.

The other patient shown by Dr. Forsyth was a boy, D.W., nine years of age, who had hurt his head in a motor accident, and who had been admitted to hospital three days later dazed and vomiting with a right parietal fracture. On the fifth day he vomited and had an epistaxis and on the ninth day, because of meningismus, lumbar puncture was performed. The cerebro-spinal fluid contained 100 cells per cubic millimetre, of which eight were polymorphonuclear and ninety-two lymphocytic leucocytes. The boy ran a high continuous temperature for eleven weeks and had occasional returns of pyrexia during the following eight months. There had been no definite disturbances of the reflexes or paralysis. The boy had not been very ill and all the usual investigations had been made. The Mantoux test gave a strongly positive reaction and the presence of a soft gland in the neck had been noted. Unsuccessful attempts had been made to culture organisms from the blood. In the course of the illness the boy had become moderately anæmic. The cerebro-spinal fluid obtained by lumbar puncture was examined frequently. On the twenty-eighth day the cell count was 50 cells, on the forty-eighth day 26 cells, and on the seventy-second day 42 cells per cubic millimetre.

Dr. Forsyth said that in this case the boy had run a continuous temperature for eight months and he was at a loss to explain it. Nothing in the neurological signs remained long enough to justify a diagnosis and there had been only a mild leucocytosis. He invited a discussion on the significance of the cellular content of the cerebro-spinal fluid and of the persistence of pyrexia in these two boys.

DR. A. P. DERHAM said that he sympathized with Dr. Forsyth's difficulties because he had had a similar case in one of his beds in the hospital. He referred to an article on acute lymphocytic meningitis which had appeared earlier in the year; an epidemic had been described in which the patients had a fairly intense lymphocytic reaction in the cerebro-spinal fluid with feverishness, but without stiffness of the neck; it had been noted that the protein content of the cerebro-spinal fluid was barely sufficient to produce a positive reaction to the Pandy test, which had been a valuable point in the differentiation from tuberculous meningitis.

DR. J. W. GRIEVE referred to benign lymphocytic meningitis with a duration of a few weeks only and a sudden onset, and commented on the association with aural conditions which had been noted in the cases of longer duration with acute exacerbations and increase in the numbers of cells in the cerebro-spinal fluid.

DR. D. O. BROWN suggested tentatively that the mode of onset was the strongest clue in the case of the boy, G.M.; he had had stiffness and rigidity of the spine from the commencement and still had rigidity and a little tenderness. It seemed possible that a process of osteitis of the first and second lumbar spines, possibly tuberculous, might be present. Dr. Brown made a further suggestion that the other boy might have chronic cerebellar abscess.

DR. G. RALEIGH WEIGALL said that he, too, had thought of the possibility of abscess in the case of D.W.; it looked as if there was some pus about him somewhere and the chronicity of the illness was not against this view. He remembered a patient who had been operated on by Dr. Trumble two and a half years after the onset of an illness characterized by amnesia, general disagreeableness and epileptic convulsions associated with some pyrexia. At operation an infected hæmatoma was found, and he thought that this condition was a possible solution of D.W.'s troubles.

DR. REGINALD WEBSTER discussed the significance of the cell count. He said that great variations from the normal were liable to occur in extreme cases. He could recall an example of tuberculous meningitis in which the cell count had not exceeded 40 cells per cubic millimetre, and a patient with poliomyelitis who had had cerebro-spinal fluid which was milky on account of the cellular content. The fact that at one stage the reaction was lymphocytic and at another increased suddenly to become a polynucleosis supported the view that a cerebral abscess was present and might still be smouldering there. Dr. Webster

considered that in the report which had appeared in *The British Medical Journal* in 1936 of the epidemic of benign lymphocytic meningitis in the north of England the cerebro-spinal findings alone were not sufficiently distinctive to separate the condition from *encephalitis lethargica*.

Dr. Forsyth, in reply, referred to some thirty-two patients with poliomyelitis without subsequent paralysis whose cases he had studied some years earlier. The cell counts had varied between 40 and 1,600 cells per cubic millimetre of cerebro-spinal fluid and none had remained ill for longer than a week or two. A patient who had had a cell count of 1,100 cells had left hospital in ten days. He considered that such conditions might now be called benign lymphocytic meningitis, but the patients that he had shown that night had been persistently feverish with increased cell counts for many months. In the case of D.W., the clinical course suggested that the irritation was extradural and the process might be one of a mild grade of septic infection.

Prolonged Pyrexia of Unknown Origin.

DR. A. P. DERHAM presented a male patient, two and a half years of age, suffering from unexplained pyrexia of several months' duration. In November, 1936, the child returned from a holiday in the hills languid and out of sorts. He had been sleeping excessively and running a high temperature. In the middle of February, 1937, following an attack of vomiting, he had had a generalized eruption which had lasted for four days; though his parents thought it was measles, his physician expressed the opinion that this was not the cause. On March 28 he had an exacerbation of evening feverishness, and it was noticed that he walked about with his body bent forward, though he did not actually complain of abdominal pain. On admission to hospital on April 2, the boy appeared toxic and flushed in the afternoon, but was relatively bright and normal in the morning corresponding with the swing in the temperature. Apart from the presence of a little muco-pus in the naso-pharynx and a few palpable glands in the neck, right iliac fossa and inguinal regions, the findings at examination were normal. On April 10 he passed several stools containing a lot of pus, some mucus and some blood streaks; the stools improved in appearance after a few days and there had been no recurrence. Apart from the persistent temperature and an increase in size of the inguinal and iliac glands, the child had not had any abnormal signs or symptoms. A number of investigations had been carried out; the Mantoux test gave no reaction on two occasions. Skiagrams of the chest, the nasal sinuses and the bones of the pelvis and lower part of the spine had been prepared, but had failed to show any abnormality. On April 6 the blood films and the differential white cell count were normal; the leucocytes numbered 22,000 cells per cubic millimetre and the hæmoglobin percentage was estimated at 92. On May 18 the white cell count was 9,000, the hæmoglobin percentage was 60 and the blood film and differential white cell count were again normal. On two occasions unsuccessful attempts were made to culture organisms from the blood. Agglutination tests gave negative results against the organisms of typhoid, paratyphoid and *Brucella abortus* infection. No abnormal mass was felt to be present on rectal examination or seen on screening the diaphragmatic area. A biopsy of an inguinal gland was reported by Dr. Reginald Webster to show adenitis with engorged vessels and much reticulo-endothelial reaction with a considerable inwandering of polymorphonuclear cells. Throat swabs and urine had been examined with negative results. The boy had gained two pounds in weight while in hospital; the weight had increased from twenty-seven to twenty-nine pounds.

Dr. Derham said that in presenting the patient he had hoped that some member of the society might be able to suggest a diagnosis that he had not already thought of, or that possibly a member might have had experience of a similar case and might be able to advise the wisest course of action to adopt. The possibility of a bacterial endocarditis had been considered, but had not been confirmed by blood culture, nor had there been present any of the classical signs of this disease except the continued swinging temperature. Dr. Derham thought that the possibility of abdominal tuberculosis seemed to be excluded by the repeated failure of response to the Mantoux test; and although he thought that Hodgkin's disease had to be considered, neither the type of temperature, the boy's comparatively good health, nor the biopsy of the gland supported such a diagnosis. When examining the boy under general anæsthetic, Dr. Whitaker had found that the patient's liver was somewhat enlarged, and this raised the question of a chronic amœbic abscess which on general principles was unlikely and which was further excluded by the absence of eosinophilia. Dr. Derham said that the diagnosis should rest on the facts already ascertained, namely, discharge of pus *per rectum* and the other signs of intraabdominal infection. It seemed probable, he said, that the child was suffering from an incapsuled abscess either in the appendiceal region or in the region of some abnormal diverticulum. He proposed to make a further attempt to carry out a satisfactory sigmoidoscopy, and in the final issue he thought that an exploratory laparatomy might be justified. Treatment up to the time of the meeting had consisted of giving a suitable well-balanced diet, rich in vitamins, the administration of iron, and, on May 22, a transfusion of six ounces of his father's blood which had been followed by a slight improvement in the patient's general appearance.

DR. F. K. NORRIS said that he had had under his care a similar patient, a boy, sent to him from Mildura, suffering from abdominal pain and a swinging temperature which had at first been diagnosed as due to influenza. The temperature had been raised for three and a half months, and at one stage the patient had passed quantities of pus and blood *per rectum*. Rectal examination had revealed no abnormality, but on abdominal palpation some thickening had been detected in the right iliac fossa. The patient had also revealed a leucocytosis and some degree of anæmia. Dr. Norris said that no special treatment had been given and the patient eventually became perfectly well, although his high swinging temperature had continued for about five months altogether. Dr. Norris considered that no special treatment was indicated for Dr. Derham's patient, nor did he think that any further investigation would be likely to reveal anything of importance. He thought that an exploratory laparotomy was not justified at the present time.

DR. J. G. WHITAKER suggested that the liver of the patient should be examined under general anæsthesia. It was somewhat enlarged and might contain an abscess. Primary amœbic liver abscess could occur in Australia and this might be the underlying condition associated with amœbic colitis.

DR. R. SOUTHBY made the suggestion that this type of case was at times due to chronic ear infection or low-grade tonsillitis, or it might be caused by infection with the *Bacillus coli communis*.

Dr. Derham, in reply, said that Dr. Webster might find amœbæ in the encysted state in the stool, but he would have expected relative eosinophilia. Dr. Derham suspected abdominal infection to be the explanation and he undertook to report the further development at a later meeting.

Eventration of the Diaphragm.

DR. J. W. GRIEVE showed a male patient, two years and two months of age, who had first come under notice at the hospital in early infancy. He had been in the ward from May 15, 1935, till August 24, 1935. During this period he had remained at the same weight and had suffered from bronchopneumonia. At one time a congenital heart anomaly of the usual kind had been suspected, but dextrocardia was diagnosed on clinical grounds. Eventually the child's condition had improved slightly and he had been discharged from hospital. The report on a skiagram of the chest, prepared on November 6, 1935, stated that an abnormality of the left lobe of the liver was present; that the left dome of the diaphragm was displaced upwards;

and that the heart was displaced to the right. The patient had been readmitted to hospital on April 28, 1937. Four weeks previously he had become ill with a slight sore throat, a rash and a cold in the head. Two weeks before admission he had commenced to take turns in which he grunted and became sleepy and feverish. These turns occurred every three or four days and lasted about twelve hours. In addition to the dextrocardia there was an area of dulness at the base of the left lung, and during the succeeding two and a half weeks turns occurred in which the patient became pale and very miserable; the temperature rose and he lay quietly with grunting respiration and appeared to be in pain; in between the attacks the patient appeared perfectly well. Blood examination revealed no abnormality and the serum did not react to the Wassermann test. On radioscopic examination it was noted that the left side of the diaphragm was raised and moved very poorly; a shadow could be seen below the left side of the diaphragm which did not move with the liver. A series of films was prepared, including one after a barium clysma; in the films the observations at radioscopy were confirmed and the separation of the shadow below the left diaphragm from the shadow of the stomach was established by barium meal given both during an attack and when the baby was normal. The absence of diverticulæ was demonstrated by the introduction of barium through a catheter in the œsophagus at various levels with the head lowered.

DR. E. R. CRISP, who had carried out the radioscopic investigation, said that he had little to add. The left side of the diaphragm did not move as well as the right and was always at a higher level; he could not get the stomach up to it; he did not think that the shadow below the left side of the diaphragm was the left lobe of the liver; the leaves of the diaphragm came down, leaving very little neck; and the spleen had been visualized and delimited and was not in the space under consideration.

DR. JOHN O'SULLIVAN said that he had examined the films at the meeting and was in general agreement with Dr. Crisp. It might be of interest to trace the course of the œsophagus, and, by means of pneumoperitoneum, to see whether the air got above the shadow under discussion and whether it could be separated off from the liver by this means.

Bilateral Hæmangiomata of the Conjunctiva.

DR. V. L. COLLINS, the medical superintendent, on behalf of Dr. D. M. Embelton, showed a child, one year and seven months of age, who had a condition which Dr. Embelton thought would interest the members. The pupils had not been visible at birth on account of the presence of symmetrical hæmangiomata of the conjunctiva. The nævi were fading gradually without treatment, but they were still very obvious. The pupils appeared after a time and the child had become able to see well.

Tuberculosis of the Ischium.

DR. D. O. BROWN showed a male patient, who had come under his notice in 1934 at the age of five years. The right knee had been injured a year earlier and the child had developed a limp with the foot parallel to the ground and the leg stiff; there was gross limitation of flexion at the hip joint in the adducted position, but otherwise the range of movement was full. No shortening could be detected on measurement and Dr. Brown had not thought that the condition resembled tuberculous hip disease. The radiographic appearances were suggestive of a destructive lesion of the right ischial tuberosity and a cold abscess was suspected to be present. Dr. Macdonald had expressed the opinion that the lesion was pyogenic. Dr. Brown had treated the child for three or four months on a double Thomas splint at Frankston orthopædic branch as if the condition was tuberculous disease of the ischium and the child had become utterly symptomless and signless. A strong positive reaction had been obtained to a Mantoux test on the skin and the child's mother was in a sanatorium with pulmonary tuberculosis. The blood sedimentation rate was fifteen. On November 19, 1934, the patient was able to walk perfectly well.

In September, 1936, Dr. Brown saw the patient again and the limp had returned with limitation of hyperextension. He was readmitted to Frankston and at an operation in October, 1936, Dr. Brown had exposed the ramus of the ischium and, though he had not found any evidence of an inflammatory lesion, he had taken out a specimen of cartilaginous material from the site indicated in the skiagram as the site of the lesion; the wound healed by first intention. Dr. Webster had reported the presence in the biopsy material of cartilaginous tissue with areas of hypoplasia suggestive of chondroma. At that stage Dr. Brown thought that he was dealing with some dissociation of bone growth and not with a tuberculous process. Progressive blood sedimentation rates were 22, 11 and 9, and the child was discharged from hospital in December, almost symptomless.

On April 8, 1937, though he had a slight limp, he was gaining weight and thriving. A big cold abscess was located on the inside of the right hip; from this Dr. Brown withdrew tuberculous pus in which Dr. Webster found tubercle bacilli. The sedimentation rate at this stage was 11.

Dr. Brown commented on the total absence of pain and of localizing signs, on the normal biopsy examination, and on the improvement in spite of the presence and progressive enlargement of a cold abscess.

Fracture of Lateral Epicondyle of the Humerus.

DR. J. B. COLQUHOUN showed two children with fracture of the lateral epicondyle of the humerus, and asked for a discussion on the treatment of this condition.

One child was a boy, six years of age, who had fallen early in February, 1937, and injured his right arm; he had fractured the lateral epicondyle and condyle, and the fragment had turned turtle and was not reducible by manipulation. Dr. Colquhoun pointed out that there was considerable danger in after-life if such a fracture was not reduced, and affirmed that replacement should be attempted by open operation. He said that the fracture was easy to expose; by pulling on the common extensor origin it could be reduced and the fragment could be sutured to the lateral epicondylar ridge and retained in the reduced position by flexion at the elbow. This procedure had been adopted in the case of the boy shown by Dr. Colquhoun, and after six weeks full flexion at the elbow was attained, and later a full degree of extension and flexion at the elbow was possible.

The other child shown by Dr. Colquhoun was a girl, eight years of age, who had sustained a similar fracture whilst riding on a bicycle with a friend on the handle bars; they had fallen off and the friend had come down on top of her and the fracture resulted. The point of interest in her case was the presence of ossification in front of the humerus, strongly suggestive of *myositis ossificans*. As a result of the satisfactory nature of treatment in plaster demonstrated at a recent meeting of the society by Dr. Forster, Dr. Colquhoun had kept the child's elbow at rest in plaster, with the idea of promoting absorption.

Dr. Colquhoun stated that there was a good deal to be said for the lateral approach to this fracture at operation. He had first seen a description of it in an article by Phillip D. Wilson in *The Journal of Bone and Joint Surgery* in 1936. The advisability of making sure that proper reduction was obtained was illustrated by the case of a nurse who had sustained a fracture of the lateral epicondyle in childhood and who subsequently had an increasing degree of *cubitus valgus* and at the age of twenty years suffered from an ulnar palsy. Dr. Colquhoun said that the fracture of the lateral epicondyle was followed by a more rapid growth of the medial side and that a tardy ulnar palsy was a possible sequela. He expressed a hope that it would not occur in those cases in which the fracture was completely reduced.

DR. J. G. WHITAKER said that he too considered that lateral approach was of great value in these cases and represented a distinct improvement. He thought that the radiographic appearances did not always give a true indication of the size of the fragment because the trochlear

was not ossified; the bony appearance in the film was that of the small ossific centre only. He remembered that on one occasion some three years earlier he had actually pulled a fragment right out of the wound, but had replaced it hastily; he had not expected so large a fragment, being deceived by the appearance of the film.

Dr. Colquhoun, in conclusion, expressed the opinion that manipulative treatment for this fracture led to the temptation to leave well alone; if one was satisfied with less than true anatomical reposition of the fragment, there were delay in union and the risk of tardy ulnar palsy or minor unsatisfactory late results. He thought that it was almost impossible to be sure of true and complete reduction without open operation.

Pathological Specimens.

DR. REGINALD WEBSTER demonstrated from a number of pathological specimens, included among which were the following.

A carcinoma of the sigmoid colon had occurred in a girl aged ten years. The girl was a patient in the surgical wards of the Children's Hospital from June to December, 1933. The unique specimen exhibited had been removed by Dr. Charles Osborn, and following the operation had been given much prominence at various meetings. For three and a half years the girl had been in good health, but in May, 1937, she had been readmitted to hospital with a note from her outside medical attendant, who expressed the opinion that the clinical features suggested the presence of a cerebral metastasis. Such had proved to be the state of affairs, and the second specimen shown by Dr. Webster was that of the cerebellum of this girl, in which a spherical tumour, hæmorrhagic in one half, protruded from the ventral aspect of the right lobe of the cerebellum. A search through the cerebrum had shown no other metastatic deposit. Unfortunately it had not been possible to secure an examination of the abdominal and thoracic viscera, as an objection to *post mortem* examination had been lodged. However, upon representations being made to the relatives, consent was given for an examination of the brain.

Lantern slides of photomicrographs of the primary and metastatic tumours were shown by Dr. Webster.

The second specimen shown by Dr. Webster was the heart of a boy, aged eight years, in whom subacute bacterial endocarditis had supervened on the congenital lesions of pulmonary stenosis and deficiency in the interventricular septum. The pulmonary stenosis was of the pre-valvular type, involving narrowing of the *conus arteriosus*, and the conus was literally choked with the large vegetations characteristic of subacute bacterial endocarditis. A non-hæmolytic streptococcus had been cultivated from the blood *ante mortem* on two occasions. Dr. Webster said that it was to be noted that the process was limited to the right side of the heart, which was the converse of the usual predilection of the lesions of subacute bacterial endocarditis to locate themselves on the left side. He had one other specimen in the museum in which the infective endocarditis was restricted to the right side of the heart. This also was a *Streptococcus viridans* infection, and in this heart, as in the one exhibited, there was a patent interventricular septum.

Dr. Webster also showed several specimens secured from children who had died of pneumonia complicated by empyema; one displayed a central pulmonary abscess, and in another multiple embolic abscesses were present in the kidneys. From the pus of the empyema in the last-mentioned instance *Staphylococcus aureus* was recovered.

Photomicrographs.

Dr. Webster next demonstrated from a series of photomicrographs and remarked that the periodicity which seemed to govern the incidence of certain pathological conditions had determined the occurrence of two instances of gross cirrhosis of the liver in young children since the last meeting of the society. One of these children had been shown at the last meeting as displaying an enlarged spleen and a moderate degree of anæmia of non-distinctive type. Since that time splenectomy had been performed. The child had recovered uneventfully and gone home; and a biopsy specimen of the liver had been secured which furnished the material for one series of photomicrographs. The other related to an infant aged one year and eight months, who had died after four weeks in hospital, during which he displayed high fever, enlargement of the liver and progressive jaundice.

Many of the terms, such as atrophic and hypertrophic, unilobular and multilobular, which had been used in textbooks for years to describe and differentiate what had been held to be separate types of cirrhosis, had little to recommend them. In Dr. Webster's view such descriptive terms were concerned with the end result of the pathological process and took no cognizance of beginnings or pathogenesis. When cirrhoses of the liver were examined from the point of view of their origin, their essential unity was apparent, for all were to be referred to the operation of diffuse hepatitis which might affect the liver in all grades of acuteness or chronicity, severity or mildness.

Dr. Webster said that such inflammatory process implied an ultimate infective or toxic factor which might reach the hepatic parenchyma by one of three routes: the hepatic artery, the portal vein, the biliary passages. The hepatitis and subsequent cirrhosis of syphilis and Weil's disease were undoubtedly examples of systematic infection, as were probably those of infective jaundice of non-leptospiral origin. The two children whom he proposed to introduce furnished instances of infection by the portal and biliary routes respectively.

Dr. Webster thought that there was perhaps some reason for the retention of the terms "portal" and "biliary" cirrhosis, as, although the end result was the same in both conditions, namely, degeneration and necrosis of parenchymal cells and the formation of much reactive fibrous tissue, the distinctive terms did indicate the sequence of events. In "portal" cirrhosis the ætiological agent arrived by the radicles of the portal vein, and the hepatic cells bore the immediate brunt of the attack, whereas in infection via the bile ducts, so-called "biliary" cirrhosis, the portal tracts suffered first and the parenchymal cells secondarily.

DR. W. SPAULDING LAURIE, at the invitation of the President, stated that it had happened that he had come across a number of patients with cirrhosis in whom he had become interested. The performance of splenectomy for the cure of Banti's disease obscured the whole question of the origin of the splenomegaly. Very frequently the spleen was enlarged in cirrhosis and the splenomegaly was not due to any disease of splenic origin. As long ago as 1898 Byrom Bramwell had reported infective cirrhosis occurring in families. Three girls and one boy died of cirrhosis of the liver three or four weeks after infection; there was no question of any alcoholic cause. For twenty years it had been definitely recognized that splenomegaly was frequently associated with cirrhosis of the liver, but the reporting of the results of splenectomy as favourable soon after the operation was quite valueless; the reports of splenectomy became of value only after 1908. Dr. Spaulding Laurie had taken up the position that in most cases of splenomegaly there was a basal liver condition; and a large number of these cirrhoses proved at autopsy had shown the criteria of a hæmolytic jaundice; in the familial cases the situation was not yet explained.

Dr. Laurie agreed with Dr. Webster when he stated that in looking to splenectomy to relieve Banti's disease one was putting the cart before the horse.

Dr. Derham thanked Dr. Laurie for his comments and expressed the view that Dr. Laurie had done a useful service in adopting a very valuable new attitude towards the syndrome.

DR. J. W. GRIEVE supplemented the comments of Dr. Webster concerning the patient with carcinomatous metastases by stating that there had been very few clinical signs of cerebellar tumour apart from a little loss of tone. Headache and vomiting had occurred, but, though looked for repeatedly, no papilœdema had been observed, and the patient had collapsed suddenly in the ward.

Post-Graduate Work.

A POST-GRADUATE SCHOOL OF SURGERY.

AN impressive ceremony took place in Melbourne on August 31, 1937, when Professor G. Grey Turner, M.S., F.R.C.S., F.A.C.S., Professor of Surgery at the British Postgraduate Medical School, delivered the inaugural address at the opening of the new wing of Prince Henry's Hospital. This marks the first stage in the reconstruction of the hospital. Under an agreement with the Royal Australasian College of Surgeons, signed on November 12, 1936, the new hospital is to become a school of post-graduate surgery.

Mr. C. F. Crosby, the President of Prince Henry's Hospital, expressed a welcome on behalf of the Board of management to the distinguished visitors, surgeons and physicians who had gathered there that day. It was a particularly happy arrangement, he said, that Professor Grey Turner should be present because in him there was a link between post-graduate surgery in this country and in the Motherland. Mr. Crosby stated that the old Homœopathic Hospital had come to the end of a long life of usefulness to the community and it had been decided to provide for and house in the new building a school of surgery. The Board of Management was indebted greatly to the architect, Mr. Leighton Irwin, and to Mr. McVilly, the Secretary of the Charities Board of Victoria, who, by their personal energy and enthusiasm had done much towards bringing to fruition the proposals envisaged by the Council of the Royal Australasian College of Surgeons and the Board of Management of the hospital. The new building which was being opened that day was to be followed by another building, twelve storeys high, behind it and by a wing coming out to St. Kilda Road. The hospital would undertake the care and curing of sick casualties, injured motorists or pedestrians, who were so numerous, in addition to general surgical work and the dissemination of surgical knowledge throughout Australia.

Sir Hugh Devine, Senior Vice-President of the Royal Australasian College of Surgeons, apologized for the unavoidable absence of Sir Louis Barnett, the President of the College, who lived in New Zealand and who had sent a congratulatory message for the occasion, and introduced Professor Grey Turner. He said that Professor Grey Turner was not only a great surgeon and the head of the British Postgraduate Medical School, but he was a Vice-President of the Royal College of Surgeons of England. It was a great honour to have him with them that day, and he invited him to address the gathering.

Professor Grey Turner acknowledged the welcome and said that the British Postgraduate Medical School was very interested in the Australian project, and on its behalf he expressed the hope that the new Post-Graduate School of Surgery would be crowned with success. He proposed to speak on the subject of post-graduate education in general rather than to refer only to surgical education. From the earliest time the leaders of the medical profession had always travelled far and wide to spread and to give knowledge and inspiration. There had always been a Mecca, but the site of the Mecca was constantly varying. Commencing in the Mediterranean basin, it had spread up into various parts of Europe and had included Great Britain; it had moved to America, and England had been rediscovered. Professor Grey Turner felt that it was probable that in the not distant future the direction would be towards Australia. He referred in detail to some of the British leaders, and mentioned in particular that Lister's work was the lodestone that had attracted men from all countries to Great Britain to see him at work. It had not always been the leaders who had enlarged the horizon, however, Professor Grey Turner observed; he commended the great Osler's book, "The Alabama Student", to the attention of those who had not read and enjoyed the account in it of the travels of a doctor one hundred years ago in search of post-graduate work on the Continent.

Professor Grey Turner said that the urge for post-graduate work was not always in the young men only; older men sought it too. At the present time there was a great renascence; there was a great demand for the opportunities which were so wisely considered necessary in this new post-graduate centre. There was no need for any doubt as to the success of the venture; the opportunities were always appreciated. There was just an element of danger that the provision of facilities might supplant personal effort and the necessity to travel, which would be fatal; but he knew that it would be the other way; the more encouragement there was at home, the more men were inclined to seek the wider field. He quite approved of holding examinations for the primary stage of the English fellowship near the homes of the graduates, but he hoped that the final examination would never be conducted outside of England; such an arrangement would rob the young men of the excuse to travel. Graduation merely entitled a professional man to become a "perpetual student"; Osler had stated that without post-graduate work men became stale in five years, in a rut in ten years, and so deeply in the rut after twenty years that they could not get out of it. He had satisfied himself and could affirm, on the best of authority, that the foundations, the undergraduate courses, were well and truly laid in this country. He then discussed "brain-dusting for doctors" and expressed the opinion that this process should occur daily by constant reading, annually by taking time to see the work of other men, quinquennially by attending congresses, and above all by the *annus mirabilis*—the grand tour—after which there should be a complete reorganization of professional work and of habits of life. They should all be opportunists; they should not plan a career which was beyond attainment; they should do the work which was nearest to hand, but should "chase opportunity with a naked sword"; ideals were for pursuit rather than for attainment, and success was one of the hardest of taskmasters; they must be prepared to rob their rather scanty leisure and be like George Borrow's gipsy, who, when not engaged in work, was engaged in taking his relaxation. In spite of the call of duty to wife or sweetheart, leisure should be found for post-graduate study. It should also be remembered, Professor Grey Turner said, that this type of study was by no means confined to the English-speaking world, and it was of some importance that the men of other countries should not get ahead of us to our disadvantage. Professional reading should become "a way of life"; happy was the man who could suit his temperament to his environment, but happier still the man who could suit his temperament to any environment; an endeavour should be made to write to fix things in the mind. It was Francis Bacon who said: "reading maketh a full man, conference a ready man and writing an exact man". Most of those present had opportunities to take part in or attend the deliberations of medical societies, but an annual reading holiday or pilgrimage to a medical shrine should not be omitted, and Professor Grey Turner would recommend that the quinquennial brain-dusting should take the form of a course at the post-graduate school. The grand tour might not be of such great value for the accumulation of facts, but it had a broadening influence on the mind and should be taken before experience of practical work had extended over too long a period of time for this broadening influence to be effective.

After these general remarks about post-graduate education Professor Grey Turner dealt more particularly with surgical post-graduate instruction. In his work the surgeon felt that usually he could find out what was wrong with an exactitude that was at times denied to the physician. There was only one way by which a surgeon could be made, and that was by apprenticeship. Surgery was special work, and the apprenticeship might have to be long and arduous, though, of course, it varied in duration according to extent and complexity. Professor Grey Turner considered that education in the actual work of surgery after graduation should extend definitely over a period of at least seven years, but, of course, a surgeon could not afford to let his education end at any stage. It was

essential that this education must take place in contact with patients. Thus it was a great advantage to have a post-graduate school attached to a great hospital. William Hunter had said that the right way to train a surgeon was to put him in a hospital where he could "attend the sick and dissect the dead". There was not nowadays the same need for systematic dissection at the post-graduate school nor for extensive operations on the cadaver, but familiarity with certain stages in certain operations and the minutiæ of the anatomy of certain regions could be obtained only by the use of autopsy material. The course of instruction would be primarily clinical; investigation should be carried out as far as possible by the surgeons in training for the elucidation of the diagnostic problems. The trainees should at least be present at the operations, even though it might be found difficult to allow them to do much operating. A full discussion should take place upon the case of each patient subjected to operation, and on the steps and technique of the operation. The post-operative course should be followed by the trainees, and all pathological material should be subjected to careful investigation, whether it had been obtained at autopsy or biopsy. The completed histories of all patients should be brought before the students. The importance of physical signs rather than radiographic evidences or laboratory tests should not be lost sight of. Most was learned from the cases worked out alone; the trainees should be entirely responsible for the investigation and correlation of the facts in the case of each patient. Professor Grey Turner said that conferences were extremely valuable in any post-graduate school, and he emphasized the extreme importance of study of the naked-eye and microscopic pathological processes. The students should not be satisfied to get reports from laboratories, and while there was a legitimate domain for instrumental methods of diagnosis this should be kept in its proper place. Certain branches of surgery involved the expert use of special instruments, and it would be desirable to be sure of having a supply of patients with special diseases which required this class of work.

Professor Grey Turner referred to the need for decision about the appointment of a guiding head for the post-graduate school; he did not wish in any way to dictate, and it might be considered advisable to place the direction in the hands of an individual or to divide the responsibility. It would be necessary to provide facilities for the study of practical anatomy of disease and of operations rather than a systematic course in pathological anatomy. He would also recommend the calling in of acknowledged experts, whether from near or from a distance, to give lectures and demonstrations. The effect of calling in a "man with a halo" to lecture to students was to widen the outlook and to entice them to take courses further afield. In every respect the new school would prove to be a clearing station for all surgical educational activities. He would advise the management to recognize the extreme importance of research, but he would stipulate that it should arise out of clinical problems. One could not just turn on research; a great deal of it necessarily required time, worry and expense, and produced nothing and led to disappointment. The ordinary operating surgeon should be properly trained and should go on with his education after graduation until he was trained. His further education he himself should decide; students should seek this further education in whatever environment suited them best. The teachers of the students should not be selected exclusively from those who had attended as students themselves. Apart from those who came for training as surgeons, others would come for special lines of work, and ordinary refresher courses should be arranged for general practitioners from distant parts of the country. Professor Grey Turner mentioned with apology that it was extremely important not to have too utilitarian a note; the academic and philosophical notes should be provided for. The students and teachers should be given time and opportunity to think. Study rooms and a suitable library and pathological museum should be provided. In particular medical history should be studied and its importance recognized. He expressed a warning against quick and spectacular methods of instruction in surgery; cinema films and "anatomy by fireworks" should be kept under suspicion. In the commencement of the course the students might be treated almost as if they were senior undergraduates; some preliminary course of instruction should be provided. With reference to accommodation, he would ask for a hostel in which informal meetings would take place between the teachers and the taught. In this venture he would urge that they should not be guided too much by precedent, but should allow the school to develop along its own lines indicative of local requirements and aspirations; the defects of other systems could be avoided and the experiences of a desirable nature incorporated. Professor Grey Turner warned the promoters that the courses must not be too expensive; the expense loomed large and affected the decision to take the course; if expensive, this feature alone would materially reduce the number of applicants for training. Further, it was necessary to move slowly to attain the best results; the school could not be put at first on the basis on which it had to stay. There should not be too much propaganda or flourishing of trumpets before the school was ready to deliver the goods. He wished to explain to the lay managers that surgery was not yet and never would be an exact science, and was guided by trial and error. Entirely new arrangements and cancellation of old arrangements would often be necessary. The public should be kept acquainted in a broad way with what was going on, but without any element of sensationalism. It was a good thing to have occasional public lectures in which the demands of post-graduate education could be set out and the knowledge disseminated that the general public, who would get the benefit, should contribute generously its share of the expenses. Demands for money would be recurrent and the doctrine that "a shroud has no pockets" should be preached to attract endowments from those with wealth to distribute.

Mr. Crosby said that the hearty applause was a tribute to Professor Grey Turner for his fine address, which had conveyed an appreciation even to a layman of the wonderful work that could be done in the new post-graduate school. He assured the Royal Australasian College of Surgeons that the Board of Management of the hospital would do its very best with the facilities available to carry on the work to a successful issue and even to extend it if necessary. The cooperation between them had been a happy one, and he would like to take this opportunity of stating publicly that his board was not a bit sorry but was very glad indeed that it had entered upon the arrangement with the Royal Australasian College of Surgeons.

Sir Alan Newton, Censor-in-Chief of the Royal Australasian College of Surgeons, added the thanks of the Fellows of the College to Professor Grey Turner for the interesting, delightful and philosophical address. He was sure the advice would be most helpful. As his colleague Sir Hugh Devine had explained, Professor Grey Turner was one of the most accomplished surgeons in the world, but devoted his life to post-graduate surgical education. The present occasion marked the completion of the pathological institute; it would be necessary to wait till the hospital was completed before the school would begin its work. It was a happy augury for the future to note the tapping on the shell of the embryo of the future school; when the time came some one other than Professor Grey Turner and necessarily less competent would be invited to remove the shell and expose the whole chick. He invited the company to inspect the new school.

A number of members of the Board of Management and of the honorary and resident medical staff of Prince Henry's Hospital conducted the visitors over the new building. The completed portion will form the pathology wing and the casualty department of the new hospital, but temporarily it is being used for kitchens and dining room and for surgical work. Two laboratories are fitted up and in use. On the floor above are resident quarters for the medical superintendent and eleven resident medical officers.

The next step, to be undertaken almost immediately, is the demolition of the old hospital, beginning with the central block, which will be replaced by a new eleven-story

block; this will include the administrative quarters, the essential services, kitchen, dining room and boiler house; four operating theatres will be provided, with a central sterilizing room and a number of small wards.

Later, two wings will be built, which will have wards in them, and one will have an X ray department and a physiotherapy department. The final section in the rebuilding will be the casualty entrance built right up to the St. Kilda Road frontage; this will have an out-patients' department and special departments. Altogether the hospital will hold three hundred beds for patients, of which one hundred will be intermediate beds.

The final step will be the erection behind the hospital of a new nurses' home to accommodate approximately two hundred nurses.

Public Health.

A BROADCAST TALK ON HEALTH.

THE following is the substance of a broadcast talk delivered over the national network on May 20, 1937, by Dr. John Dale, Medical Officer of the City of Melbourne.

I have often talked about health and wondered what it is I talk about! The word is used so loosely and with so many meanings. The general idea has been, at any rate, that health is something that we naturally have, unless we have or catch something called a disease. Now health is certainly not a thing; it is not material, and obviously it is what we call an abstraction. My present definition of health is that health is the quality of life. I would ask you to apply that definition for yourselves and see if it does not fit and help to clarify your ideas about health. You will agree that the quality of life may be good or bad or "so-so", and that it may be judged from two points of view: either as to the state of your body as the doctor examines it, objectively, or as to your own subjective feelings—how you feel.

Notice also that health, so defined, is placed upon its proper pedestal. From any elevated point of view—philosophic, spiritual, religious, rational or materialist—the quality of human life is surely the supreme good, the object of the highest aspirations, the matter which is of chief concern, of more concern than any other. It seems indeed to be the very aim of the universe.

Thus the Minister of Health is the Minister responsible for the quality of the lives of the citizens, which ought to make him think! In point of fact, the Minister would hesitate to accept this wide responsibility, and in practice the word "health" is used in much narrower—regrettably narrow—limitations. We have come to think of health as just one department or division of activity and administration, on a par with commerce, markets, defence, finance, parks and gardens, transport, and so on. In schools it becomes a "subject", with arithmetic, history and geography, and the "subject" consist of habits of cleanliness, snippets of natural science, "physical jerks" and housekeeping. In reality, as I now put it to you, health includes, transcends and is the objective of all subjects in school and of all departments of public administration. Human welfare is the object of them all; anything that affects human life (and what does not?) affects the quality of life—affects health.

We cannot, in actual fact, provide for the health of the people and then pass on to some other provision or undertaking. As individuals we cannot look after our health and then go on to do other things not connected with health. We cannot get health out of a bottle and have done with it, despite the statements of the advertisements. Health is with us and pursues us all the time.

Nevertheless we must in actual practice subdivide our activities and responsibilities, and do one thing at a time.

One such subdivision is what we call preventive medicine or public health. A very interesting book called "Health and Human Progress" has just appeared, written by Dr. René Sand, a member of the Health Committee of the League of Nations. It includes a preface by Edouard Herriot, late Premier of the French Republic. In this preface Herriot briefly reviews the progress of public health, the banishing of epidemic diseases, the greater safety of life. He quotes Professor Winslow:

> If we had but the gift of second sight to transmute abstract figures in flesh and blood, so that as we walk along the street we could say "that man would be dead of typhoid fever, that woman would have succumbed to tuberculosis, that rosy infant would be in its coffin", then only should we have a faint conception of the meaning of the silent victories of public health.

But he goes on to say:

> These victories ought not, however, to disguise the magnitude of the task which will confront us as soon as we have the courage to face it. It is immense.

Now that is perfectly true. Up to date preventive medicine has achieved wonders in preventing death and in saving life. The task that now confronts us is to improve the quality of life and to make it better worth living.

Now, if health is the quality of life, it must be a matter of opinion. It is a matter of opinion, and you must have a standard to judge it by. It is a commonplace that from the physical point of view individuals, and communities too, are apt to be satisfied with themselves as they are. If everyone in a community has malaria or hookworm infection without knowing it, there is no complaint on that score until the trouble is discovered; and when it is remedied—then what an advance!

So it is today; we are alive, and life is longer and safer; but how much better physically, how much more alive mentally, we could be! I referred just now to the prevalent idea that health was something we naturally have unless we somehow lose it. Not a bit of it! Poorliness is just as natural as vigorous growth. Even with the lords of creation Nature does not make bricks without straw, and the parable of the seeds on stony ground applies to us also. So we have just come to realize that our physique and that of many of our fellow citizens, though it is improving, is not so good as it should be, and that we have much preventible sickness.

A few years ago the leading hygienist of Great Britain, Professor Leonard Hill, wrote as follows:

> The streets of our cities are trod by hosts of men and women, ugly of complexion, ill-grown, weaklings, withered and worn, incapable of strenuous muscular action at a time which should be their prime, developed in cunning, fear and sensitivity to pain by a mean struggle for existence in mean streets. Contrast these with the wild ass of Sind, whose skin shines with the wonderful gloss of perfect condition and whose strength and fleetness is such that to ride him down a horesman has to take in relay seven fresh horses. The wild asses snuffed up the wind like dragons. Who hath sent out the wild ass free and men into slavery.

Dr. Sand, in the book which I mentioned just now, quotes many official figures and records which show that the health of the poorer classes in England is much inferior to that of the more fortunate.

Things are not so bad as that here, but many of our people, and worst of all our children, are not being supplied with the food, clothing and shelter necessary to ensure the physical health or wholeness of their bodies, and that despite an abundance—an assured plenty—of the materials required.

In his presidential address to the Royal Society of Great Britain, Sir Gowland Hopkins said: "Science has repeated on the grand scale the miracle of the loaves and fishes—but they are not being distributed."

And what of the lives we lead? The quality of life must be judged also from this point of view: are we well; are our lives good? What do we ourselves think?

In a way this question needs no answer. If we are happy, if we are keenly alive, interested in what we are

doing—in science or art or some craft or sport or hobby, if we are much too busy to bother about our health, then certainly we are well; but if not, if we are not interested in that way, then we are not well, and no doctor will succeed in keeping us whole. The joy of life comes from the satisfactory exercise of our faculties and capacities. If we are bored, aimless, frustrated, worried, frightened, despairing or oppressed, then certainly we are not well. The doctor may find nothing wrong with us, or he may find little things wrong with us—teeth, tonsils, appendix, perhaps—and deal with them, deal with them all perhaps; and even then life is not good.

As regards this mental health, we have no such progress to record as we have in the matter of mere physique. It is doubtful indeed if matters were ever worse. One has only to contemplate the number of people whose lives are dull and monotonous, the number who, in order to live, are forced to carry out distasteful work, the number of the unemployed and insecure. None of these can be healthy, as we would all like them to be healthy.

To sum up: health, as the quality of life, may be assessed from two aspects.

On the one hand there is health in its original meaning of wholeness, the growth and maintenance of each unique individual as designed by Nature and heredity at conception. Judged from this objective point of view, the quality of life is dependent on the supply of essentials, such as food, air and light, and on protection from injury by cold, parasites, poisons *et cetera*. It is incompatible with poverty and ignorance. The standard is slowly improving as poverty and ignorance are overcome and as wealth and science increase.

On the other hand, there is health in its meaning of well-being, that is, being or living well. From this subjective point of view the quality of life corresponds to the joy of life, happiness or contentment, and depends upon the satisfactory or creative exercise of the faculties and talents of the individual. It is wholly dependent on education in the broadest sense: that is, on opportunity and encouragement, and on increasing economic freedom. It is incompatible with poverty and oppression. From both points of view, especially the second, "the task which confronts us is immense", but if we have the courage to face it, the prospects are more alluring and feasible than at any time in human history. We can improve health in proportion as we value human life.

Human life is becoming more precious, more highly esteemed, and this is not only for military purposes, since some of the least militaristic peoples (such as the Scandinavians) are leading us in its appraisement. There is no evidence, it seems, that human beings today are more intelligent or less selfish than were our ancestors of one hundred thousand years ago; yet in the interval there has appeared in accelerating growth a new power on the earth, the power of science, the social inheritance of all mankind. By its aid not only have we solved the old problems of famine and scarcity, but we may succeed in making our self-interest gradually more enlightened, and may realize that the only bearable fellow citizen is the whole and happy one. That is why I venture to be optimistic.

Obituary.

WILLIAM WITHERS EWBANK.

WE are indebted to Dr. H. Boyd Graham for the following appreciation of the late Dr. William Withers Ewbank.

The late Dr. William Withers Ewbank was born in North Adelaide about seventy-three years ago. His father was the late Archdeacon Ewbank, and he was the eldest of three brothers, one of whom was the late Dr. Arthur G. Ewbank, of London, whose son, William Withers Ewbank, is the senior classical master at the Lower School of John Lyon, Harrow, and a recognized authority on the teaching of classics. The other brother was an Anglican clergyman who died some fifteen years ago.

William Withers Ewbank was educated in England and attended Durham University. He qualified in England in 1887 and did post-graduate work at Saint Bartholomew's Hospital. He was for ten years associated with Howard A. Kelly at the Johns Hopkins Hospital, Baltimore, United States of America. He then returned to the land of his birth and practised surgery at the Perth General Hospital before commencing in private practice in Adelaide as a gynæcologist. In the course of his preparatory work in America William Ewbank had been to some pains to understand the aseptic methods which were superseding the antiseptic in surgery, and prior to the Great War he paid another visit to America. On his return he came to Melbourne and practised in Collins Street for about twenty-five years. He devoted himself to the study of chronic streptococcal infections, and gave up surgery twenty years ago in the belief that Rosenow and his school had made an epoch-making change through the discovery that the streptococci were responsible for almost all chronic disease, including many diseases of the heart. Thereafter he practised the use of autogenous vaccines and general hygienic measures for the eradication of the streptococci, and published a short description of his views on the cause and cure of chronic disease in 1935.

He numbered amongst his intimates many members of the old school, such as Hamilton Russell, Dunbar Hooper and Herman Lawrence, all of whom have now passed on. He was a member of the Victorian Branch of the British Medical Association from 1917 till he died on August 11, 1937, at his home in Inkerman Road, Caulfield, after a very brief illness.

Dr. Reginald Webster writes:

My association with the late Dr. William Withers Ewbank was initiated some fifteen years ago by an introduction effected by the late Dr. J. W. Dunbar Hooper, and although it transpired that I was to have many dealings with him, I have never felt that I penetrated beyond a certain reticence and reserve which he maintained about himself. In other words, he was a man whom it was difficult to get to know intimately—a lonely man, I had reason to believe.

I can speak, however, of professional relationships, and in this sphere I always found him frank, direct, honourable and punctilious in the discharge of his obligations. He was an ardent disciple of E. C. Rosenow, with whom he occasionally corresponded, and whose writings on elective localization of streptococci made a very strong appeal to him. His methods in practice were based largely on the theory of focal infection and elective localization of streptococci. Very often I could not go all the way with him in his application of this conception, and many an amicable discussion occurred between us.

Beneath a manner that was occasionally somewhat gruff Ewbank concealed an essentially kind nature. He was passionately fond of animals and very proud of his dogs. I well remember his very great distress on the occasion of the sickness and death of one of his canine companions. His extra-professional reading was mainly in the realm of economics, and he had formulated definite and somewhat iconoclastic views on the distribution and exchange of material wealth.

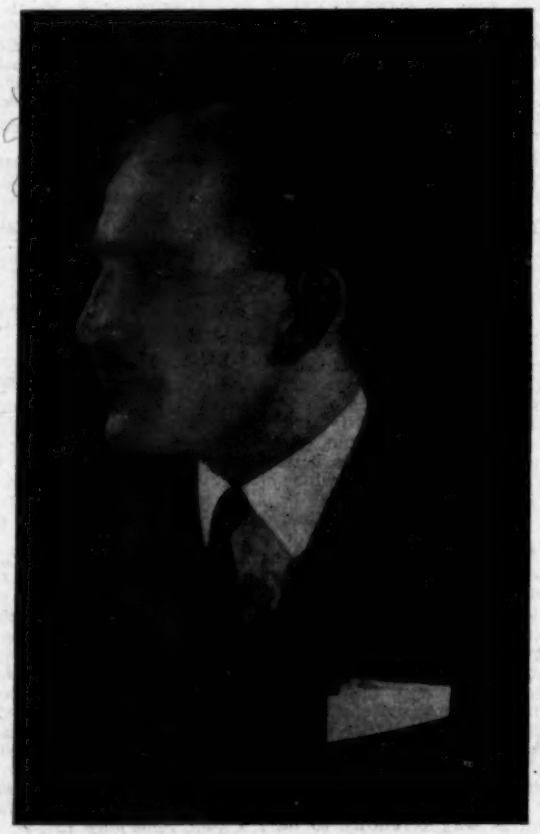
Ewbank was a man whose principles of practice were freely discussed and criticized. He was aware of this, and countered with an assertion of the "faith that was in him" in an article which he published about two years before his death.

ARTHUR MORITZ LAZARUS.

WE are indebted to Dr. Thomas King for the following account of the career of the late Dr. Arthur Moritz Lazarus.

Dr. Arthur Lazarus died on August 11, 1937, from anterior poliomyelitis, after an illness of six days. As a

medical student he enlisted in the Australian Imperial Force and served in the ranks. After graduating M.B., B.S., Melbourne, in 1924, he went to England and obtained the diploma of the Fellowship of the Royal College of Surgeons, England, in 1929. He filled several important appointments as a house surgeon there, especially one year at All Saints' Genito-Urinary Hospital and one year at the famed Saint Peter's, London, where he studied genito-urinary surgery, which was his great surgical interest and in which he showed great skill and patience. Before returning to Australia he was resident surgical officer with charge of a number of surgical beds in the well-known Dudley Road Hospital, Birmingham, in order to develop his general surgical capabilities. He visited various European countries, and spoke German fluently.



Although intending to practise genito-urinary surgery as a specialty, he eventually accepted the appointment as acting out-patient surgeon at Saint Vincent's Hospital, whilst his friend Mr. Fred Colahan acted as indoor surgeon for Sir Hugh Devine this year; and he showed the same breadth of vision, soundness of judgement and kindliness to his patients in general surgery. Prior to this he had been first assistant to Mr. J. Forbes Mackenzie, who was a great friend to him. By character an idealist and mystic, he had the very highest of the racial qualities developed in him. Both to his seniors and juniors he was an influence for good. Highly religious in the true sense, in his short life he had accomplished much in that his influence for good amongst his friends was universally acknowledged by them. Being very sensitive and incapable of obtruding his personality, it was a long time before he began to reap the reward which was due to his true worth. When he was just about to become a permanent and valued member of the Saint Vincent's Hospital staff and his private practice was established, he died at the early age of thirty-nine, after a short illness that brought daily anxiety to his friends, and eventually anguish. Seldom has anyone had so many misfortunes and obstacles to contend with during a short and promising career. Throughout all he was never heard to complain. Just twenty-four hours before his own last illness his only child and son was afflicted with the same disease, but fortunately is now on the road to complete recovery. His wife, whom he nursed for two years through a serious illness which began just after he had obtained the Fellowship of the Royal College of Surgeons, London, stayed with him at the Fairfield Infectious Diseases Hospital, but her encouragement, which had helped so much in other matters, in this fight for life was of no avail.

During the last five years he devoted the major part of his time to working daily at Saint Vincent's Hospital, where he had acted as assistant surgeon and latterly as acting out-patient surgeon. His lovable character and goodness were universally recognized. He was never to know the consternation which his last illness caused amongst all these, nor the shock of realization that we were never to see him again on this earth. He was a loyal friend, a wise counsellor, and his goodness of heart and memory will remain with those who knew him. I wish to express my deep affection for him and the loss of his friendship through death.

Dr. Kevin O'Day writes:

The death of Arthur Lazarus after a brief illness has cast a gloom over the profession in Melbourne. Everyone who came in contact with him was impressed by his natural charm of manner. To his friends he represented everything that was best in the practice of medicine. His knowledge and skill were acquired from years of arduous training and experience, and to these he added a humanity rare indeed in its sincerity. The ultimate well-being of the patient was his only aim, and his great fear was that the time might come when through pressure of work he could not give to each individual the meticulous care so necessary for his welfare. His place in the affections of his friends can never be filled, and his wife and only son can be assured of the deepest sympathy of all his colleagues.

Dr. F. J. Colahan writes:

May I be permitted to pay a brief tribute to the memory of my friend Arthur Moritz Lazarus. By his tragic and untimely death the medical profession has lost one of its most promising and capable surgeons. By disposition modest and retiring and hating publicity in any shape, he was quickly recognized by all who came in contact with him to possess soundly balanced vision and judgement, and a meticulous mind for the smallest detail of his work. Working with him on the staff of Saint Vincent's Hospital, one found him not only a loyal colleague, but a staunch friend. To his patients he gave sympathy and understanding and was both counsellor and friend. It is no exaggeration to say that his name and work will long be remembered with affection and gratitude by patients, students and colleagues alike. Only yesterday, whilst walking through the out-patient department, did I find an old patient weeping at his loss. It may be some slight consolation to his wife to know that many others will mourn with her, and that their sympathy, though in many cases perhaps unexpressed, will be none the less real.

Dr. J. Forbes Mackenzie writes:

At Warrnambool, Victoria, in 1933, at a Victorian Branch meeting of the British Medical Association, I first met Arthur Lazarus. He had been told that I was to be his "boss"; and that is what he always called me to other people. He told me later that he did not like the look of me; one cannot blame him for that. He became my operating assistant, and for the two years or more that he assisted me was the most inspiring, helpful assistant that anyone ever had. He was self-effacing, quiet and never obtruded his opinion; but when he was asked, his suggestions were invaluable. In short, he was the perfect assistant.

Apart from my feelings of grief at the loss of such a gentle friend, a certain feeling of resentment arises in my mind. Little Arthur, as I called him, drove in a horse battery in France during the War, and said that he would not have survived but that his horses always seemed to know that they had to protect him. Perfectly marvellous! This he said to me often. Right! One must, to give an impression of a man, write as he spoke.

Lazarus was perfectly trained and completely loyal to his training. He stood by British training, as he stood by everything British. He, I know, would like me to say this. Religion or politics he never discussed. Work and how to do it better were his sole topics. Admiration of the other man's work was his constant theme. "Well worth watching; he makes it look so easy!" was his frequent description of other surgeons' work.

As to his own work, he was a born urologist. Frankly, until I met him I regarded urology as a side-line "boosted" by the makers of cystoscopes. This, of course, is a chaffing exaggeration; but his sympathy with any ignorance was wonderful.

I cannot write more. I have tried to give an impression of one different from anyone whom I have ever met, one who all the time knowing more, made one feel that every word said to him was great teaching; at the same time he was firm in his own opinions.

Others I know have written about little Arthur Lazarus; but to me personally the loss of association with his beautiful intellect is grief beyond measure.

JOHN BROOKE MOORE.

We regret to announce the death of Dr. John Brooke Moore, which occurred on August 29, 1937, at Bathurst, New South Wales.

CHARLES ULIC CARRUTHERS.

We regret to announce the death of Dr. Charles Ulic Carruthers, which occurred on September 17, 1937, at Balmain, New South Wales.

The British College of Obstetricians and Gynaecologists.

Intending candidates for the diploma of the British College of Obstetricians and Gynæcologists (D.C.O.G.) are advised that the following resolution was passed at the last meeting of the council:

> That all applications for the D.C.O.G. from the Dominions be referred to the appropriate reference committee.

A similar resolution was previously passed by the council in regard to candidates for membership of the college (M.C.O.G.).

Intending candidates, in order to save delay and disappointment, should therefore communicate with one of the members of the reference committee in Australia before going to England. The committee can then send its opinion, as to whether the resident qualifications (general, obstetrical and gynæcological) are sufficient or not, to the Examination Committee of the British College of Obstetricians and Gynæcologists. The members of the Australian reference committee are: Professor J. C. Windeyer, University of Sydney, Chairman; Professor R. Marshall Allan, University of Melbourne; Dr. T. G. Wilson, University of Adelaide.

University Intelligence.

THE UNIVERSITY OF SYDNEY.

At recent meetings of the Senate of the University of Sydney, the following degrees were conferred:

Master of Surgery (*M.S.*): Henley Henderson Harrison, M.B., Ch.M.

Master of Surgery (*Ch.M.*): Robert Burnside Carter, M.B., Thomas Galbraith, M.B.

Bachelor of Surgery (*B.S.*): Charles Bertram Cox, M.B., Harold Dundonald Macky Hercus, M.B., Philip Thornton Millard, M.B., David Klineberg, M.B.

Proceedings of the Australian Medical Boards.

QUEENSLAND.

The undermentioned have been registered, pursuant to the provisions of *The Medical Acts*, 1925 *to* 1935, of Queensland, as duly qualified medical practitioners:

Elcoate, Robert Leslie Gough, M.B., 1908, B.S., 1909 (Univ. Melbourne), Tara.

Madden, Vera Mary Magdalen, M.B., B.S., 1936 (Univ. Sydney), Brisbane.

Smith, Alan Frederick, M.B., 1926, Ch.M., 1936 (Univ. Sydney), Mount Isa.

Books Received.

RECENT ADVANCES IN INDUSTRIAL HYGIENE AND MEDICINE, by T. M. Ling, M.A., B.M., M.R.C.P., with a foreword by J. A. Nixon, C.M.G., M.D., F.R.C.P.; 1937. London: J. and A. Churchill Limited. Large crown 8vo, pp. 220, with 29 illustrations. Price: 12s. 6d. net.

CLINICAL ENDOCRINOLOGY, by S. A. Loewenberg, M.D., F.A.C.P., with a foreword by H. A. Reimann, M.D.; 1937. Philadelphia: F. A. Davis Company. Medium 8vo, pp. 852, with 194 illustrations and 37 charts and tables.

OPERATIVE OBSTETRICS: A GUIDE TO THE DIFFICULTIES AND COMPLICATIONS OF OBSTETRIC PRACTICE, by J. M. Kerr, LL.D., M.D., F.C.O.G., with the assistance of D. McIntyre, M.D., F.C.O.G., and D. F. Anderson, M.D.; Fourth Edition; 1937. London: Baillière, Tindall and Cox. Royal 8vo, pp. 860, with 338 illustrations. Price: 45s. net.

THE ENDOCRINES IN THEORY AND PRACTICE. ARTICLES REPUBLISHED FROM THE BRITISH MEDICAL JOURNAL; 1937. London: H. K. Lewis and Company Limited. Demy 8vo, pp. 287. Price: 9s. net.

MEDICAL PRACTICE IN OLD PARRAMATTA: AN HISTORICAL REVIEW OF VILLAGE DOCTORING IN THE COLONY OF NEW SOUTH WALES, by Keith Macarthur Brown; 1937. Australia: Angus and Robertson Limited. Double crown 8vo, pp. 152, with illustrations. Price: 12s. 6d. net.

THE DIAGNOSIS OF NERVOUS DISEASES, by Sir James Purves-Stewart, K.C.M.G., C.B., M.D., F.R.C.P.; Eighth Edition; 1937. London: Edward Arnold and Company. Demy 8vo, pp. 850. Price: 35s. net.

MEDICINE FOR NURSES, by W. G. Sears, M.D., M.R.C.P.; Second Edition; 1937. London: Edward Arnold and Company. Crown 8vo, pp. 443, with illustrations. Price: 8s. 6d. net.

PRE-NATAL AND POST-NATAL MANAGEMENT, by J. St. George Wilson, M.C., M.B., Ch.M., F.R.C.S., L.R.C.P., F.C.O.G., with a foreword by Sir Comyns Berkeley, M.C., M.A., M.D., F.R.C.P., F.R.C.S., F.C.O.G.; 1937. London: Edward Arnold and Company. Demy 8vo, pp 214, with illustrations. Price: 10s. 6d. net.

MEDICAL RESEARCH COUNCIL OF THE PRIVY COUNCIL. SPECIAL REPORT SERIES, NUMBER 222: THE DEVELOPMENT OF CARDIAC ENLARGEMENT IN DISEASE OF THE HEART: A RADIOLOGICAL STUDY, by J. H. Palmer; 1937. London: His Majesty's Stationery Office. Medium 8vo, pp. 63. Price: 1s. net.

CATECHISM SERIES. ANATOMY (BRAIN, SPINAL CORD, REGIONAL EMBRYOLOGY). PART VII, by C. R. Whittaker, F.R.C.S.E., F.R.S.E.; 1937. Edinburgh: E. and S. Livingstone. Crown 8vo, pp. 76. Price: 1s. 6d. net.

PHYSICAL DIAGNOSIS: THE ART AND TECHNIQUE OF HISTORY TAKING AND PHYSICAL EXAMINATION OF THE PATIENT IN HEALTH AND DISEASE, by D. C. Sutton, M.S., M.D.; 1937. St. Louis: The C. V. Mosby Company; Australia: W. Ramsay (Surgical) Proprietary Limited. Medium 8vo, pp. 495, with 298 text illustrations and eight colour plates. Price: 30s. net.

THE TECHNIC OF LOCAL ANÆSTHESIA, by A. E. Hertzler, A.M., M.D., Ph.D., LL.D., F.A.C.S.; Sixth Edition; 1937. St. Louis: The C. V. Mosby Company; Australia: W. Ramsay (Surgical) Proprietary Limited. Super royal 8vo, pp. 284, with illustrations. Price: 30s. net.

Diary for the Month.

SEPT. 28.—New South Wales Branch, B.M.A.: Medical Politics Committee.
SEPT. 30.—South Australian Branch, B.M.A.: Branch.
SEPT. 30.—New South Wales Branch, B.M.A.: Branch.
OCT. 1.—Queensland Branch, B.M.A.: Branch.
OCT. 5.—New South Wales Branch, B.M.A.: Council (Quarterly).
OCT. 6.—Victorian Branch, B.M.A.: Branch.
OCT. 6.—Western Australian Branch, B.M.A.: Council.
OCT. 7.—South Australian Branch, B.M.A.: Council.
OCT. 7.—Tasmanian Branch, B.M.A.: Council.
OCT. 8.—Queensland Branch, B.M.A.: Council.
OCT. 12.—New South Wales Branch, B.M.A.: Organisation and Science Committee.
OCT. 12.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
OCT. 14.—Tasmanian Branch, B.M.A.: Branch.
OCT. 19.—New South Wales Branch, B.M.A.: Ethics Committee.
OCT. 20.—Western Australian Branch, B.M.A.: Branch.
OCT. 21.—New South Wales Branch, B.M.A.: Clinical Meeting.
OCT. 21.—Tasmanian Branch, B.M.A.: Council.
OCT. 22.—Queensland Branch, B.M.A.: Council.
OCT. 26.—New South Wales Branch, B.M.A.: Medical Politics Committee.

Medical Appointments.

Dr. J. H. Thorp has been appointed Government Medical Officer at Clermont, Queensland.

Dr. G. Fitz Hill has been appointed Government Medical Officer at Dubbo, New South Wales.

Dr. L. C. E. Lindon has been appointed Surgeon and Dr. J. E. Hughes Clinical Assistant to the Neurosurgical Clinic at the Adelaide Hospital, Adelaide, South Australia.

Dr. E. Atkinson, Dr. G. Ashburton-Thompson and Dr. G. W. Barker have been appointed Members of the Midwives' Registration Board of Western Australia.

The following appointments have been made at the Adelaide Hospital, Adelaide, South Australia: Dr. M. Schneider, Honorary Ophthalmologist; Dr. G. H. B. Black and Dr. J. A. Rolland, Honorary Assistant Ophthalmologists; Dr. S. Pearlman and Dr. T. L. McLarty, Honorary Clinical Assistants to the Ophthalmic Section.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," pages xiii to xv.

ALFRED HOSPITAL, PRAHRAN, VICTORIA: Honorary Assistant to Gynæcologist.
AUSTIN HOSPITAL FOR CANCER AND CHRONIC DISEASES, HEIDELBERG, VICTORIA: Honorary Officers.
SAINT VINCENT'S HOSPITAL, SYDNEY, NEW SOUTH WALES: Honorary Clinical Assistants.
TAMBO HOSPITALS BOARD, TAMBO, QUEENSLAND: Medical Superintendent.
VICTORIAN EYE AND EAR HOSPITAL, MELBOURNE, VICTORIA: Resident Surgeons.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135 Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17	Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 178 North Terrace, Adelaide.	All Lodge appointments in South Australia. All contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.

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